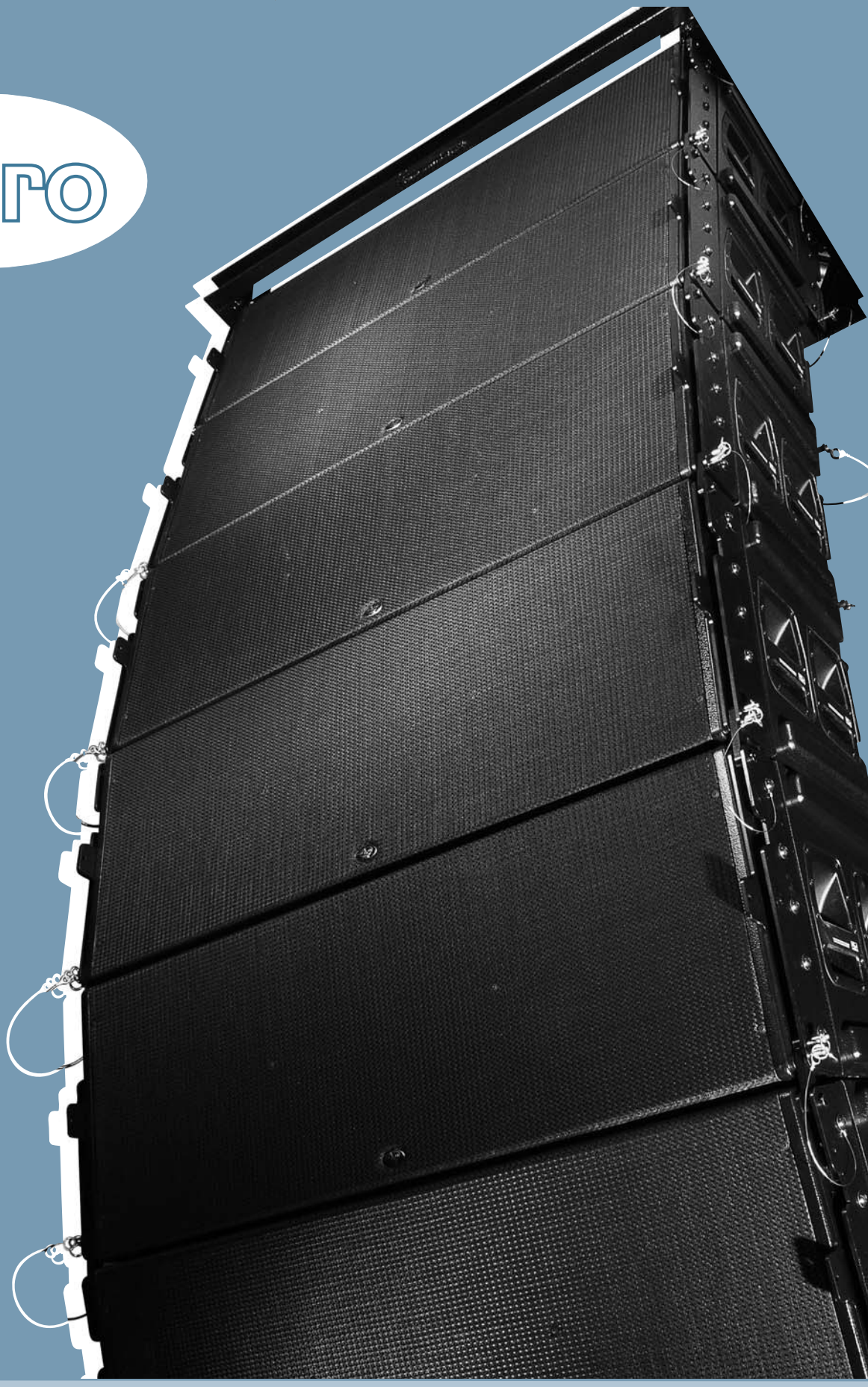


Aero-48 MANUAL DEL USUARIO / USER'S GUIDE

D.A.S. SOUND PRODUCTS

Precauciones de Seguridad

El signo de exclamación dentro de un triángulo indica la existencia de importantes instrucciones de operación y mantenimiento en la documentación que acompaña al producto.

El doble cuadrado indica equipo de Clase 2.

No exponga este equipo a lluvia o humedad.

No emplace altavoces en proximidad a equipos sensibles a campos magnéticos, tales como monitores de televisión o material magnético de almacenamiento de datos.

No existen partes ajustables por el usuario en el interior de este equipo.

Safety Precautions

The exclamation point inside an equilateral triangle is intended to alert the users to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.

The double square indicates Class 2 device.

Do not expose this device to rain or moisture.

Do not place loudspeakers in proximity to devices sensitive to magnetic fields such as television monitors or data storage magnetic material.

No user serviceable parts inside.

1. SYSTEM DESCRIPTION

The D.A.S. Audio AERO series offers two units for applications requiring precise control of the vertical coverage and high sound pressure levels. The AERO-48 is an externally powered, three-way, high efficiency line array module which integrates two 15" low frequency units with 4" voice coils, four 8" mid-range devices which utilize 2.5" voice coils and two compression drivers with 3" coils and 1.5" exit geometry in a single unit. The compression drivers are coupled to two Serpis high frequency plane wave adaptors insuring coherent high frequency summing and the generation of a flat, isophasic wave front. When increased sound pressure level in the low frequency range is required, the system can be used in conjunction with the AERO-218SUB subwoofer unit.

The system is ideal for applications such as large-scale outdoor/indoor events in arenas, stadiums or theaters. Use of the DSP-3VS digital processor is recommended for the AERO-48 and the DSP-1Sub for the subwoofer system. Not using the DSP-3VS digital processor with the AERO-48 will adversely affect the sound quality and may damage system components.

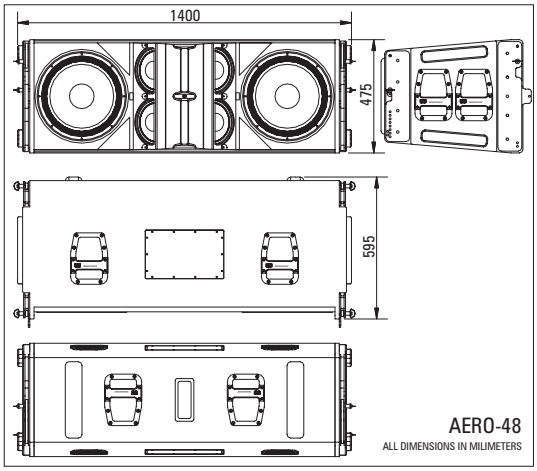
Both units are manufactured using 15/18 mm Finnish Birch plywood. The AERO-48 enclosure shape is trapezoidal with 5º angles. The AERO-218SUB enclosure is rectangular. The Aero-48 system incorporates captive rigging hardware which is compatible with one another and designed to provide a fast, simple and safe rigging by means of quick release safety pins. Splay angles can be changed from 0º to 3.2º in 0.8º increments and from 3.2º to 9.6º in 1.6º increments.

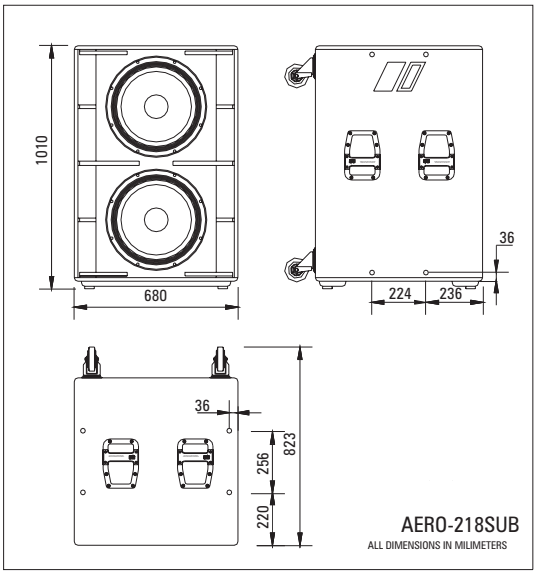
To facilitate transport, the AERO-48 units are equipped with a PL-48 front dolly panel attached by means of the rigging hardware. The front dolly panel is useful when rigging systems. The PL-48S, a metal dolly for vertically stacking 3 to 4 AERO-48 units is available as an accessory. The AERO-218SUB units can be moved by way of the four rear located casters.

The loudspeakers used in the system feature advanced technologies; new TAF (*total air flow)* cooling systems, Neodymium magnetic circuits which allow for important weight reductions, titanium diaphragms for the high frequency sections, and low-mid frequency cones manufactured using crossed fibers and elastic suspension that provide exceptional stability in the vertical plane.

The model AERO-48 includes two 15GN 15" cone transducer with 4" EFW voice coils and Neodymium magnet assemblies in a bass-reflex configuration. Four 8MN, 8" speakers arranged on a V shape, incorporating 2.5" EFW voice coils, Neodymium magnet assemblies and TAF cooling system are used for mid-range reproduction. High frequencies are handled by two M-10N high frequency compression drivers with 3" EFW coil, Neodymium magnet and 1.5" exit coupled to twin SERPIS plane wave guide. The SERPIS plane wave adaptor also serves as a heat sink for the compression driver.

The AERO-218SUB includes two 18GN 18" cone transducers with 4" EFW voice coils and Neodymium magnets. This cabinet is intended for applications when extending the frequency range of the system is required.





2. RIGGING SYSTEM

2.1 WARNING

This manual contains needed information for flying DAS Audio line array systems, description of the elements and safety precautions. To perform any operations related to flying the system, read the present document first, and act on the warnings and advice given. The goal is to the allow the user to become familiar with the mechanical elements required to fly the acoustic system, as well as the safety measures to be taken during set-up and teardown.

Only experienced installers with adequate knowledge of the equipment and local safety regulations should fly speaker boxes. It is the user's responsibility to ensure that the systems to be flown (including flying accessories) comply with state and local regulations.

The working load limits in this manual are the results of tests by independent laboratories. It is the user's responsibility to stay within safe limits. It is the user's responsibility to follow and comply with safety factors, resistance values, periodical supervisions and warnings given in this manual. Product improvement by means of research and development is ongoing at D.A.S. Specifications are subject to change without notice.

To this date, there is no international standard regarding the flying of acoustic systems. However, it is common practice to apply 5:1 safety factors for enclosures and static elements. For slings and elements exposed to material fatigue due to friction and load variation the following ratios must be met; 5:1 for steel cable slings, 4:1 for steel chain slings and 7:1 polyester slings. Thus, an element with a breaking load limit of 1000 kg may be statically loaded with 200 kg (5:1 safety factor) and dynamically loaded with 142 Kg (7:1 safety factor).

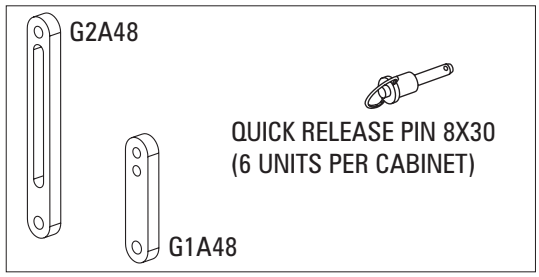
When flying a system, the working load must be lower than the resistance of each individual flying point in the enclosure, as well as each box. Hanging hardware should be regularly inspected and suspect units replaced if in doubt. This is important to avoid injury and absolutely no risks should be taken in this respect. It is highly recommended that you implement an inspection and maintenance program on flying elements, including reports to be filled out by the personnel that will carry out the inspections. Local regulations may exist that, in case of accident, may require you to present evidence of inspection reports and corrective actions after defects were found.

Absolutely no risks should be taken with regards to public safety. When flying enclosures from ceiling support structures, extreme care should be taken to assure the load bearing capabilities of the structures so that the installation is absolutely safe. Do not fly enclosures from unsafe structures. Consult a certified professional if needed. All flying accessories that are not supplied by DAS Audio are the user's responsibility. Use at your own risk.

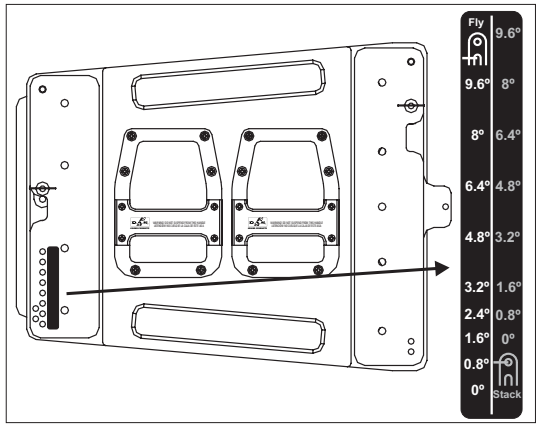
2.2 DESCRIPTION/ACCESSORIES

DAS Audio AERO-48 line array systems, include 2 rigging structures on each side of the box. Manufactured from zinc plated steel they are painted black and are affixed to an internal plate with special crop resistant screws. Two special stainless steel guides are assembled to each of the structures: G1A48 (front guide) and G2A48 (back guide), allow for stacking or flying of boxes. Splay angles can be changed from 0º to 3.2º in 0.8º increments and from 3.2º to 9.6º in 1.6º increments. To lock both guides, six (6) quick release safety pins (supplied) must be used.

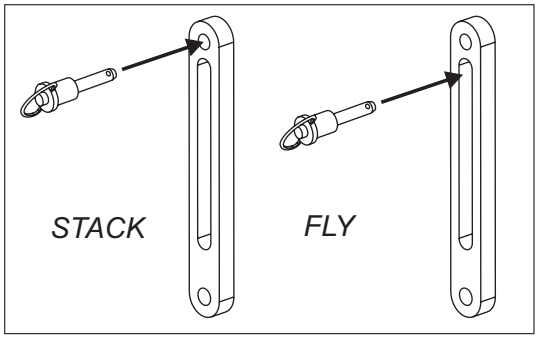
The G1A48 front guide provides a solid connection to the box and whatever is on top of it, while the G2A48 rear guide determines the vertical splay angle (whether stacked or flown), as a function of the hole where the pin gets inserted.



To aid the setting of the G2A48 guide in the corresponding hole in the top box, each hole is labeled with an associated angle, both for stacked and flown applications. To fit the guides into the holes, highly resistant 8 mm quick release pins with a ball safety lock are used.



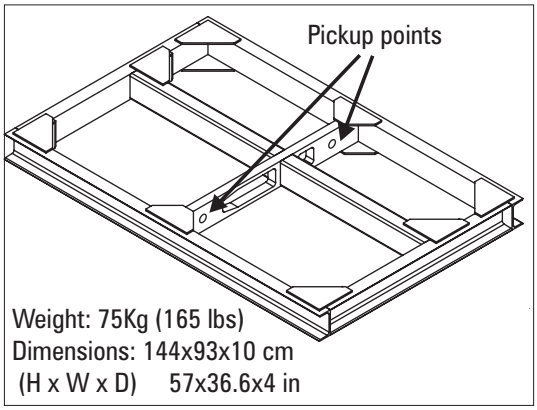
For flying boxes and defining the splay angle, the pins must be inserted in the slot of guide 2, G2A48, whereas for stacking (*stacked*), the pin goes through the top hole of the guide.



All of the elements needed to rig or stack the systems are integral to the enclosure (G1A48, G2A48 and the quick release safety pins). The additional items needed are the AX-AERO48 flying grid (bumper bar), chains and hoists, the PL-48 or PL-48S dolly platforms and the AX-COMBO flying grid.

A) AX-AERO48

The AX-AERO48 grid is made from 100 x 50 x 6mm steel tubing and is designed to handle great loads. It features a center reinforcement bar that is also used for the lifting slings. The force of both the rear and the front chain hoist will determine the tilt angle of the whole array. The structure will be attached to the first enclosure of the array by means of the guides G1A48, G2A48, and six quick release safety pins.



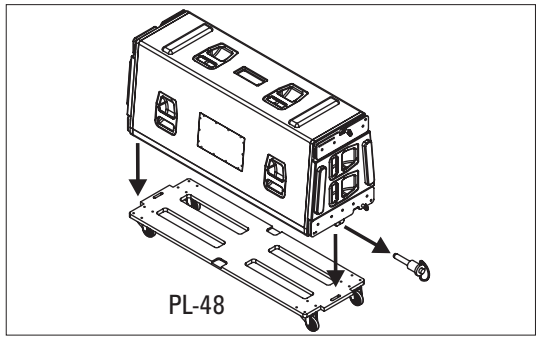
B) Chain hoists

All units in a column will be flown from the AX-AERO48 flying grid (bumper bar), which should be used with two hoists, one located in the front and the other in the rear. The hoists should have a minimum of 1 Ton load capacity when flying up 8 units and a 2 Ton load capacity when flying 9 to 16 units.

	Chain hoist load capacity
1-->8cabinets	**>1000Kg**
9-->16cabinets	**>2000Kg**

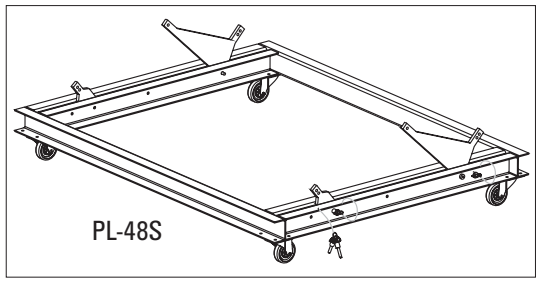
C) Platform PL-48

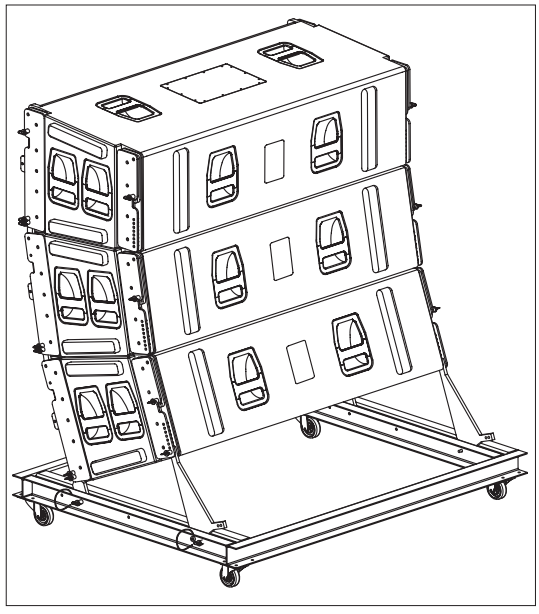
The PL-48 dolly panels facilitate transport of the AERO-48 systems. They can also be used to facilitate flying the systems. Each cover is attached to the enclosure by using the flying hardware attached to each box and is fixed with the quick release safety pins.



D) PL-48S

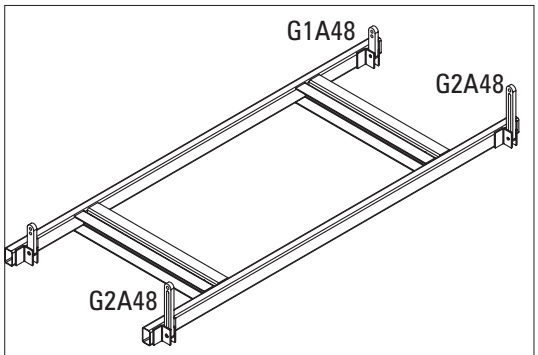
The PL-48S platform is a valuable accessory which allows up to 3 or 4 AERO-48 units to be transported in a stacked position, ready to be flown. The PL-48S is made from steel and has 4 heavy duty casters with locking brakes.



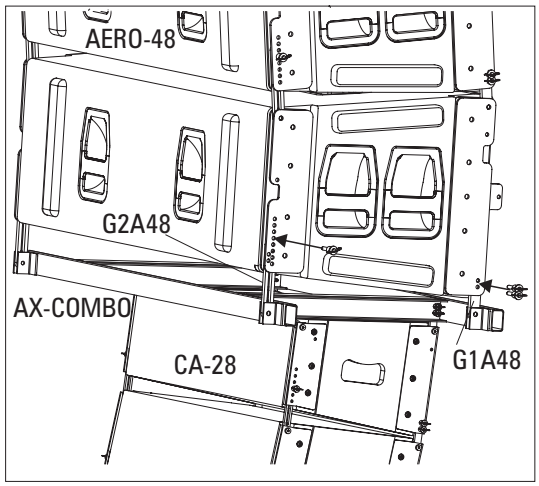


D) AX-COMBO

The AX-COMBO is a rigging adapter to be used when Aero-28 units are needed to be flown under AERO-48 units as dowfill systems. Maximum 6 CA-28A units and 8 CA-28/CA-28B units can be flown from this rigging grid. The AX-COMBO includes front and rear steel guides which permit variation of the angle between it and the last AERO-48 cabinet in the cluster. Angles vary from 1.8º to 9.6º.



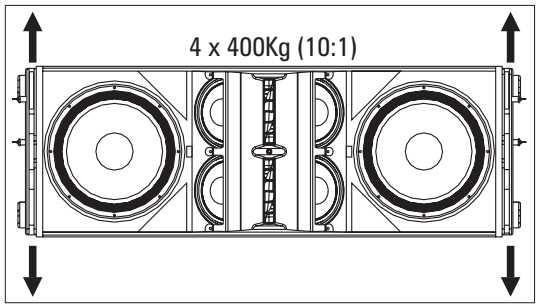
Weight: 16.5Kg (36.3 lbs)
Dimensions: 143x60x5cm (56.3x23.6x2in)



The AX-COMBO is joined to the last AERO-48 cabinet using G1A48 and G2A48 included steel guides and 6 quick release pins. The angle depends on the hole of the rigging structures where the pins are inserted, through the slots of G2A48. The first AERO-28 unit is joined to the AX-COMBO using its G1A and G2A included cam links.

2.3 SAFETY FACTORS

The safety factor is defined as the coefficient between the breaking load limit and the maximum safe working load limit (SWLL). In this case, the breaking load limit of each of the flying points is 4,000 kg (8,820 lbs) as determined by destructive testing in independent laboratories. With a 10:1 safety factor, a total amount of 1,600 kg (3,527 lbs) can be flown from the 4 flying points. Each flying point has a capacity of 400 kg (882 lbs) with a 10:1 safety factor.



The maximum number of units that can be suspended from the AX-AERO48 flying grid is 16. The maximum limits established by the manufacturer should never be exceeded.

The use of two hoists with a load capacity as expressed on the previous page is mandatory. It should be kept in mind that at certain moments, the complete load may be supported by only one of the hoists. This is why the load capacity of the individual hoist must be superior to the weight of the array column.

3. ASSEMBLING AN ARRAY

3.1 TRANSPORTING THE CABINETS

AERO-48 units can be transported by using the front panel dolly PL-48 or by using the PL-48S steel dolly which can transport a maximum of 3 AERO-48 stacked in an arc or 4 units stacked vertically.

The Aero-218SUB can be transported on the rear located casters. Their rectangular shape facilitates stacking without the use of the rigging hardware.

3.2 PLANNING/INSPECTION

Before installing the AERO systems it is a good idea to run a simulation with the AEROWARE program utilizing the venue dimensions. This way we can determine the needs that should be met by the rigging structures such as hoists, cranes, beams, rigging points, etc. Besides providing weight information, the program also provides users with splay angle information, safety pin positions and coverage predictions.

It is extremely important to assure that each and every one of the aforementioned structures is capable of supporting a superior load than that of the complete system.

Inspection is the next step after planning and acquiring all the necessary parts needed to elevate the systems. All parts, including the hardware attached to the enclosure, the safety pins, etc. should be thoroughly inspected before each use. Units exhibiting deformations, cracks or any other defect should be replaced with new units.

It is important to establish an inspection routine for the complete rigging system before each event or installation as well as establishing the maximum load specifications of the hoists to be used.

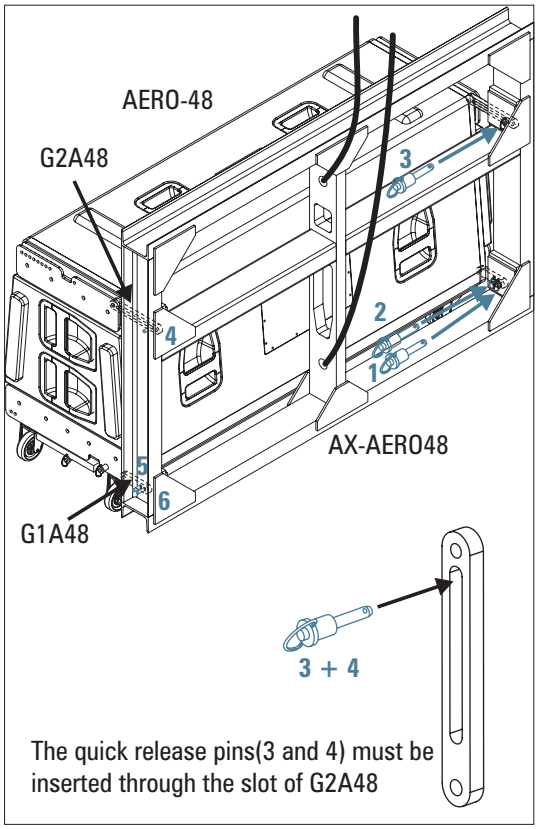
Rigging should be carried out by experts familiar with the way the systems function and their characteristics.

On occasions, it may be convenient to have additional tie down points to impede the array from twisting or swinging.

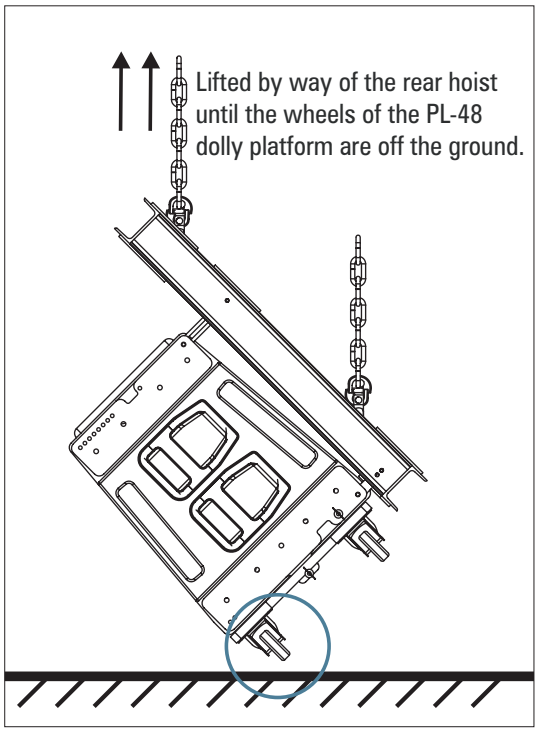
3.3 ASSEMBLING AN ARRAY "ONE BY ONE"

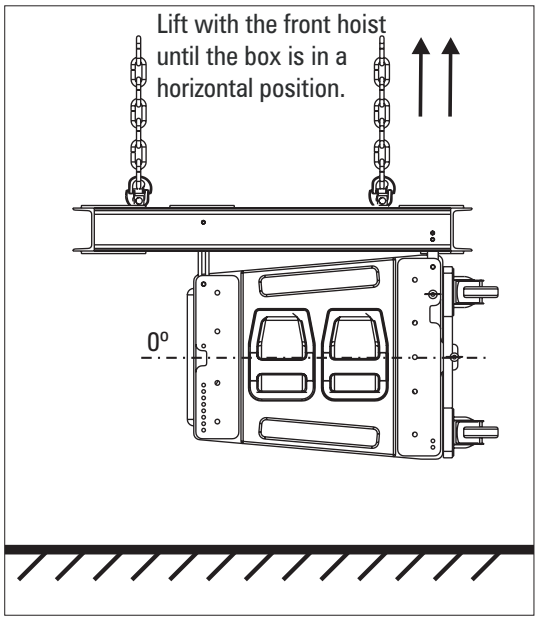
When few units are to be used (minimum systems recommended is 6 units) or when the dolly platforms cannot be used due to a lack of space, the enclosures will have to be hung "one by one". The first step will to attach the AX-AERO48 grid structure to the hoists. The chain slings need to be attached to the structure using the shackles provided with the grid. Once this has been accomplished, the grid structure can be placed in a vertical position by lifting the rear hoist and lowering the front hoist so that the rear of the grid is on top and the front of the grid at the bottom, ready to receive the first box.

The next step is to attach the first unit to the grid by introducing the G1A48 and G2A48 guides in the receiving points of the grid structure and assuring them with the six safety pins. The safety pins should be inserted in the slot of the G2A48. It is very important to make sure that the pins have been inserted and locked correctly.

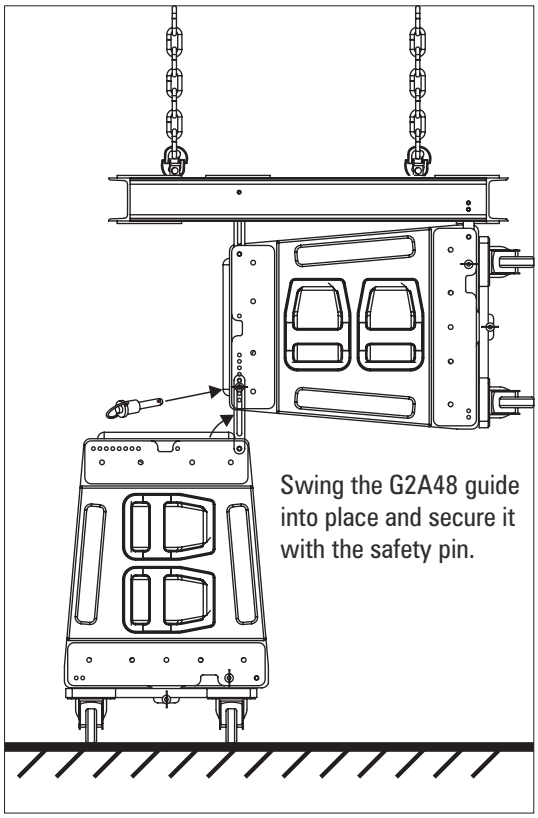


Once the first unit of the array has been attached to the AX-AERO48, the assembly should be lifted by way of the rear hoist until the wheels of the PL-48 dolly platform lift off the ground. From this point on, the front hoist can be used to lift the box into a horizontal position.

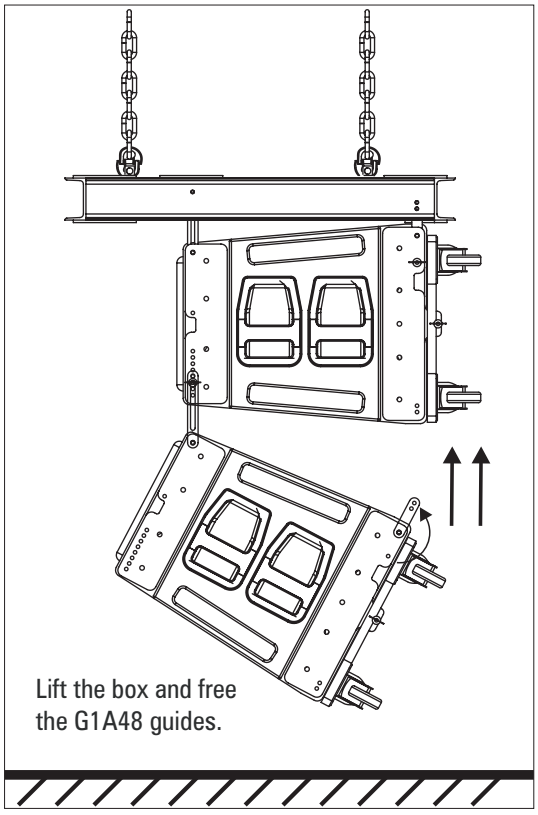


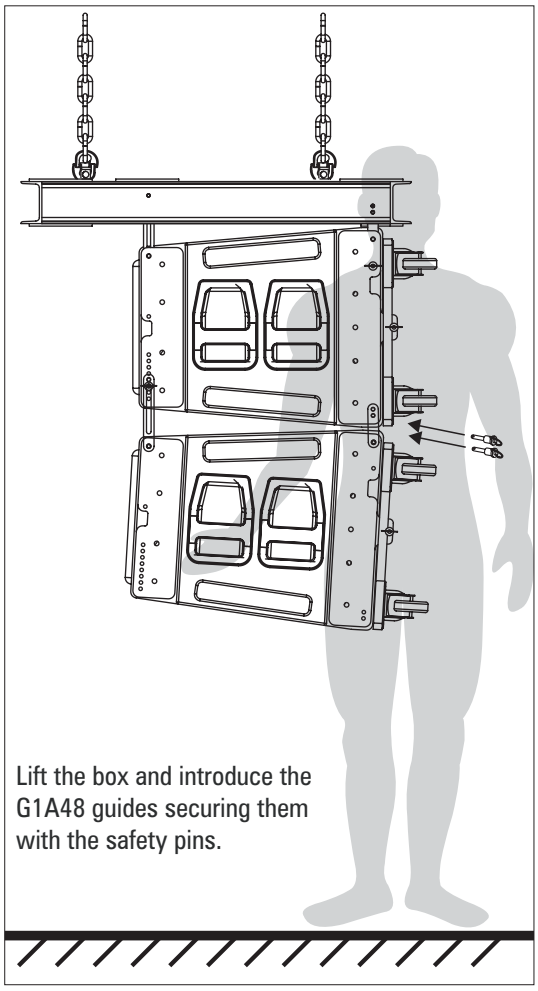


Once the first box has been placed at 0º and raised approximately 75cm (30 in) the second box of the array can be placed nearby. Once located in position, the G2A48 guides of the second box should be freed and inserted in the rear located receiving points of the suspended box and secured with the safety pins.



Once the splay angle between the first two boxes has been determined, the front of the box can be lifted into place. Three people will be needed to undertake this operation, two to lift the box and one to fit the G1A48 guide and safety pins into the upper box.





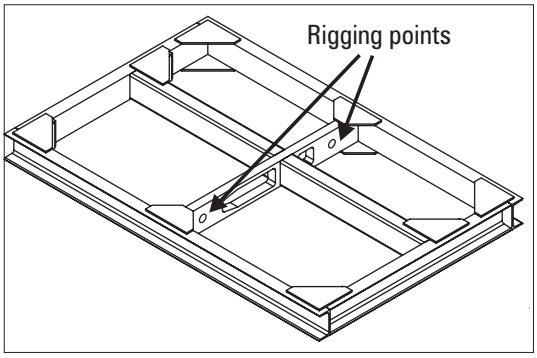
Once the boxes have been joined, the front dolly panels can be removed. The next boxes should be attached "one by one" using the methods described. Finally, the array should be hoisted to the correct height and secured with slings to avoid swinging.

This method is more time consuming than assembling an array by the "all at once" procedure, but is appropriate for situations due to a lack of space in which to array the system. During the process, the safety pins should be checked making sure they are secured correctly. Once the complete array has been lifted into place, additional slings should be attached to secure the array and avoid swinging.

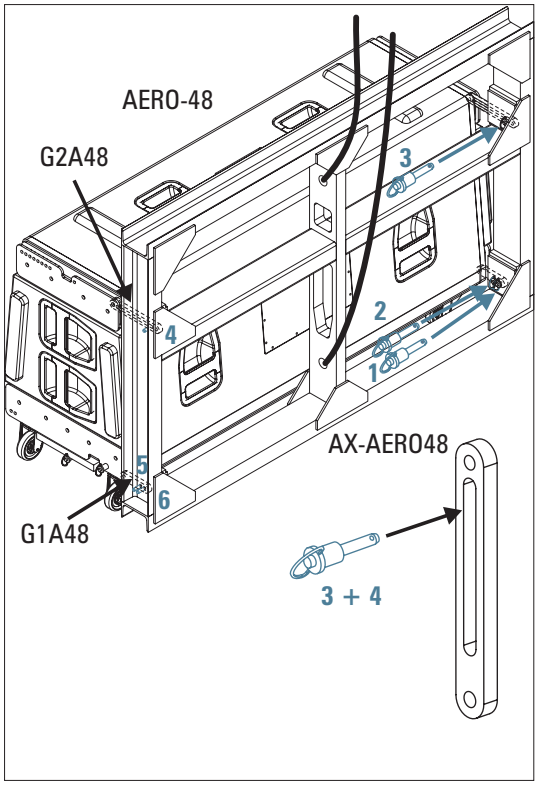
3.4 ASSEMBLING AN ARRAY USING THE PL-48 PLATFORM

The PL-48 platform can be used to easily transport AERO-48 units to the assembling area. To use this method of assembling and hoisting the array, there must be enough space to permit linking all the boxes from the front of the the rigging hardware.

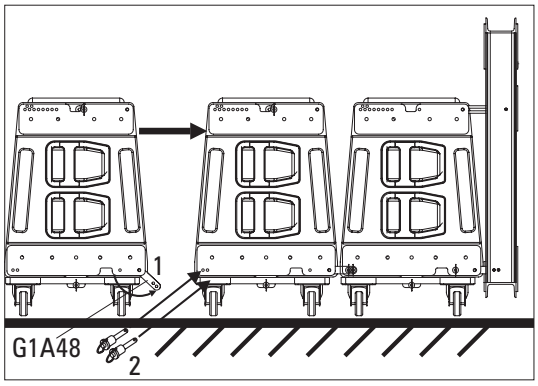
The first step will be to attach the AX-AERO48 grid and the 2 hoists. Once this has been accomplished, the grid structure can be placed in a vertical position by lifting the rear hoist and lowering the front hoist so that the rear of the grid is on top and the front of the grid at the bottom, ready to receive the first box.



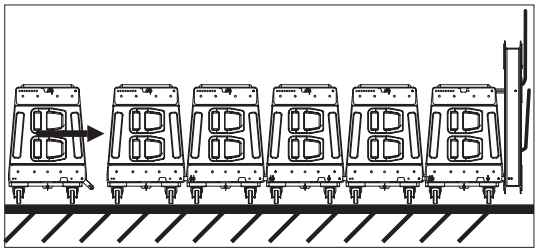
The next step is to attach the first unit to the grid by introducing the G1A48 and G2A48 guides in the receiving points of the grid structure and assuring them with the (6) safety pins. The safety pins should be inserted in the slot of the G2A48. It is very important to make sure that the pins have been inserted and locked correctly.



Once the first box is attached to the structure, the remaining boxes should be brought to the array and attached repeating the previous steps (1 and 2) using G1A48 guides and safety pins per side making sure that the pins have been inserted and locked correctly.



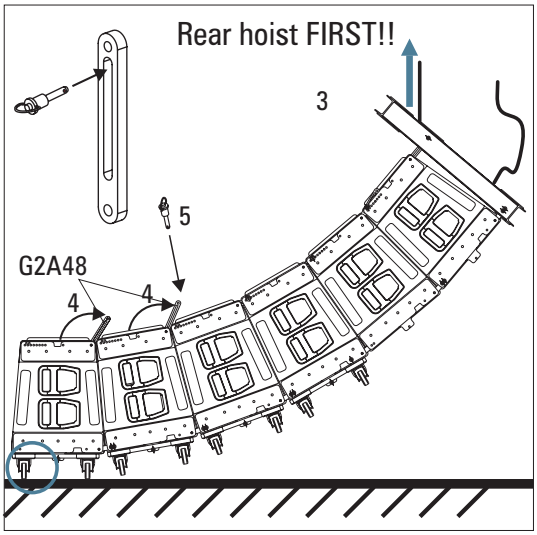
Proceed to attach the remaining units in the same manner until all the array units are attached to one another. For example, if we are assembling a six unit array, the process will be repeated six times. When all the units are attached, the complete array is ready to be hoisted.



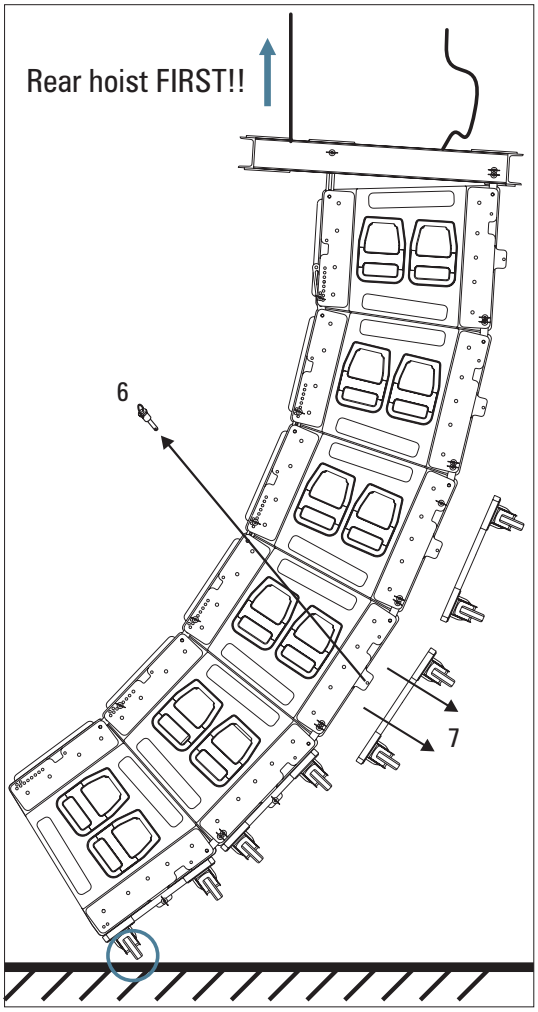
The complete assembly should begin being lifted from the rear hoist (3) so that the rear of the enclosures come together due to their trapezoidal shape. The front motor will be used only to take up slack in the chain, all the weight should be on the rear hoist. Proceed in this manner until the wheels of the last enclosure are off the ground. From here on, the array can now be lifted with both motors.

When the rear of the enclosures come together, the G2A48 rear guides should be positioned (4) into the hardware of the box above, inserting (5) the safety pins in the correct angle position. Since the boxes are flown, the safety pins should be in the slot of the G2A48 guide.

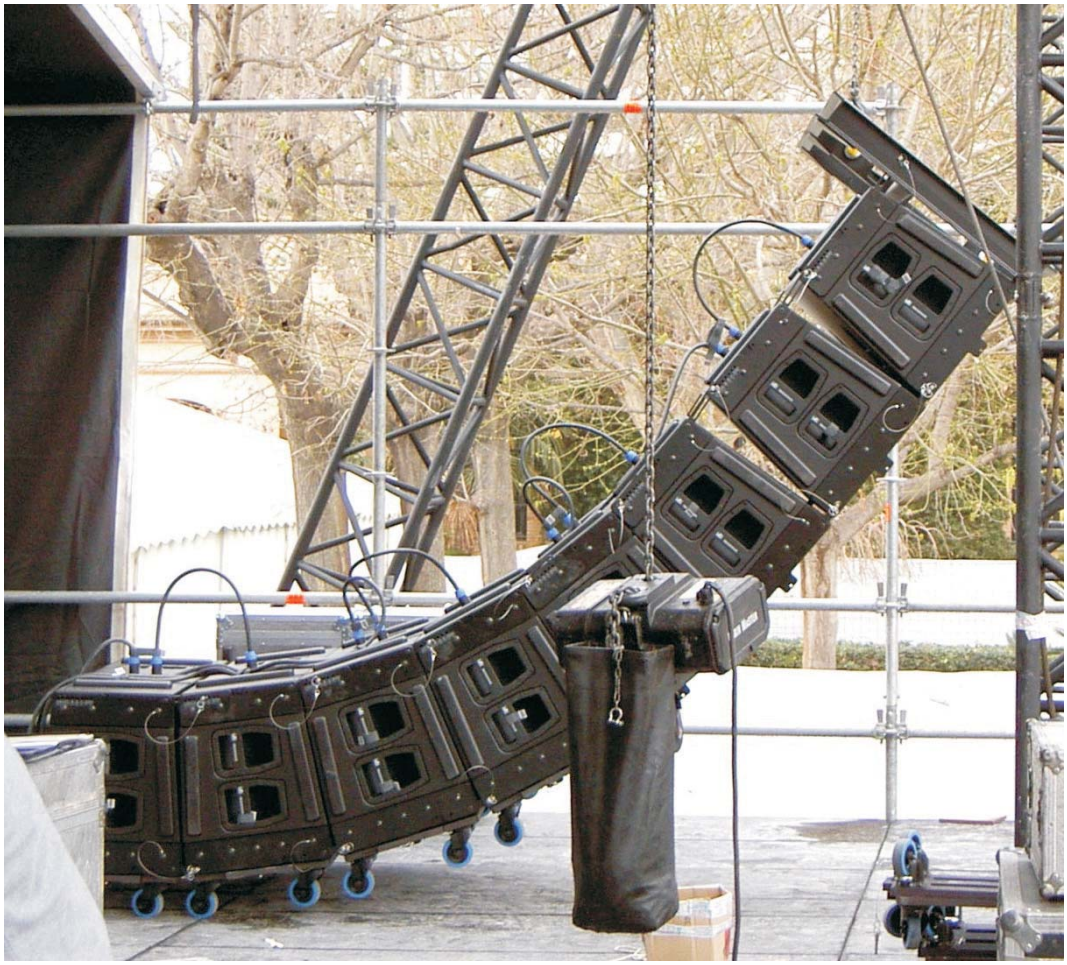
As the array assembly is lifted (6 & 7), the PL-48 platforms should be removed.



The front motor will be used only to take up slack in the chain, all the weight should be on the rear hoist. When the wheels of the last enclosure are off the ground the array can be lifted with both motors.



Once the complete array has been lifted into place, additional slings should be attached to secure the array and avoid swinging.

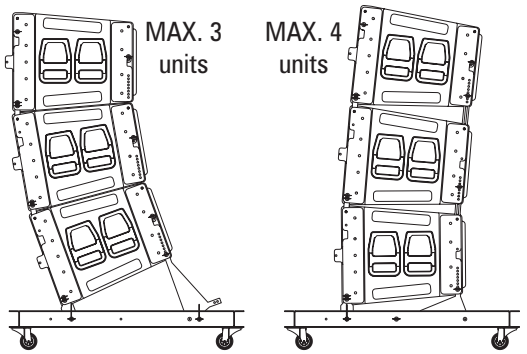


To lower the system, both hoists should be used until the lowest box is about 1 meter from the ground. From there on, only the front hoist should be used so that the array assembly begins to lean forward, at the same time, the PL-48 platforms should be reattached. When the wheels of the lowest enclosure are firmly on the ground, the array assembly can now be lowered using the rear hoist.

While the array assembly descends, the rear of the enclosures will come together, at that moment, the safety pins which hold the G2A48 guides in place should be removed. Once removed, the guides should be swung back into the box they belong to. Finally, the boxes should be totally detached from one another by releasing the G1A48 guide.

3.5 ASSEMBLING AN ARRAY USING THE PLATFORM PL-48S

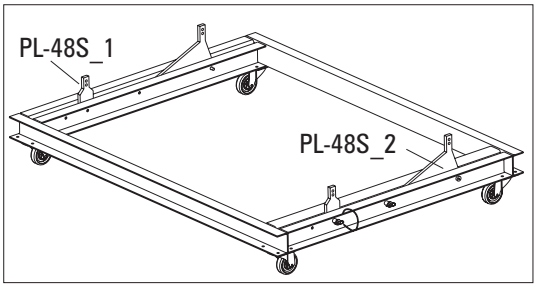
The PL-48S platform can be used to easily transport 3/4 units of the AERO-48; in both arc shape or stacked on the platform.



Splayed units on PL-48S ready to be rigged.

Units stacked on a PL-48S.

The PL-48S platform has two types of moving pieces. One of them is fixed (PL-48S_2) and can only be swung around, the other is free (PL-48S_1) and is joined to the platform by way of a safety pin. The smaller piece PL-48S_1 attaches to the front enclosure hardware and the larger PL-48S_1 attaches to the back:

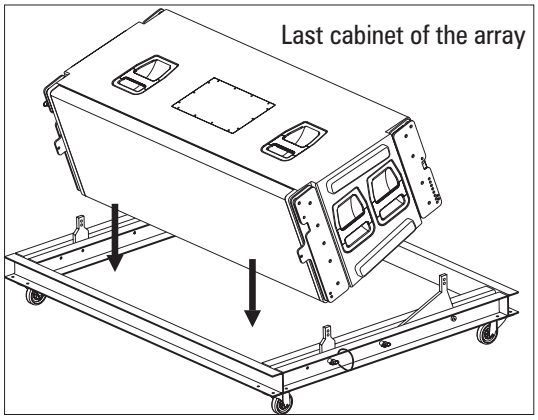


The PL-48S platform can be used to transport boxes forming a vertical arc, ready to be flown or simply stacked.

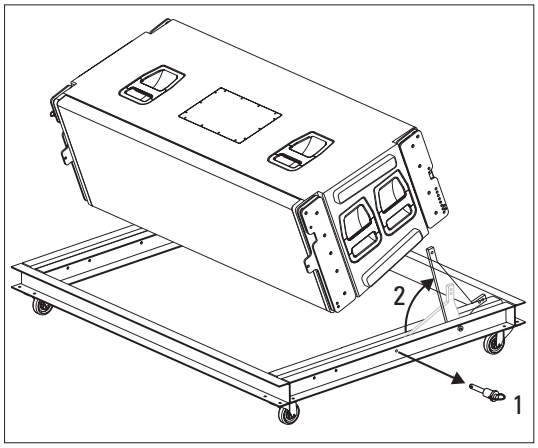
Either way, due to the weight of the boxes, it is recommended that for the first time, the enclosures be placed on the platform from a flown position. In other words, the array should be suspended (either one by one or using the PL-48S) and then lowered onto the PL-48S in groups.

A) Cabinets splayed in arc (MAX. 3 units):

If we want to place six AERO-48 units on 2 PL-48S, the first step would be to suspend them all, and then lower the array assembly onto the platforms in groups of three.

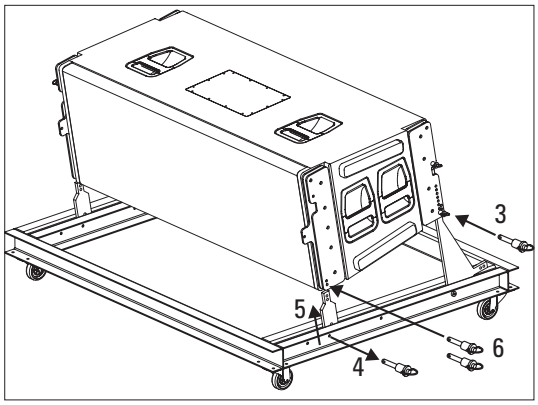


Lower the array until the lowest box is about 15 cm (aprox. 6 in.) above the PL-48S platform.

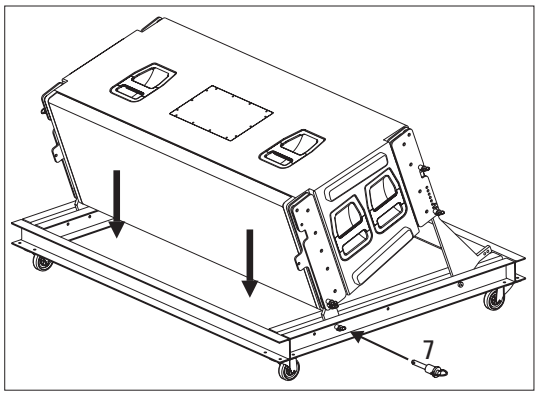


Release the PL-48S_2 piece by removing the safety pins (1). Next, swing the pieces and introduce them (2) into the rear rigging hardware of the lowest box, securing them with the safety pin (3).

Once the two PL-48S_2 have been attached to the boxes (3) using one safety pin per piece, the PL-48S_1 pieces can be attached. Remove the safety pins (4)and insert them into the rigging hardware (5) securing them (6) by using two pins per piece.

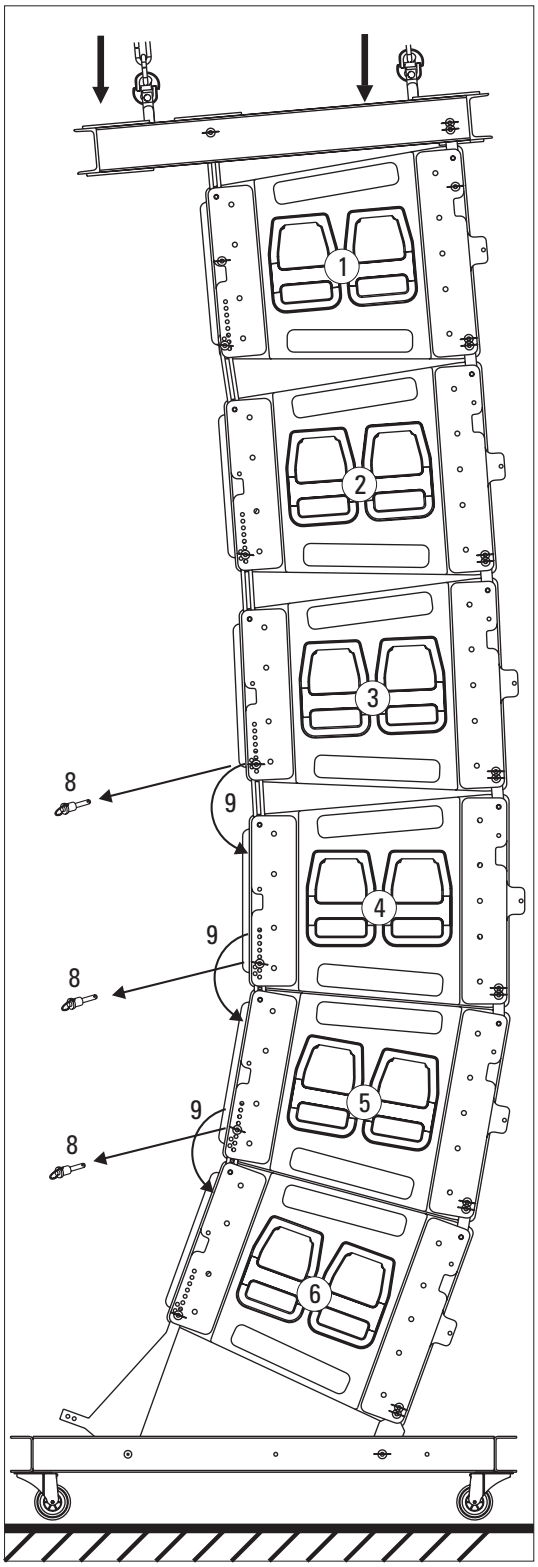


Once the PL-48S_1 and PL-48S_2 have been secured to the lower box, this should be lowered so that the PL-48S_1 piece can be secured to the PL-48S platform (7) using the safety pins.



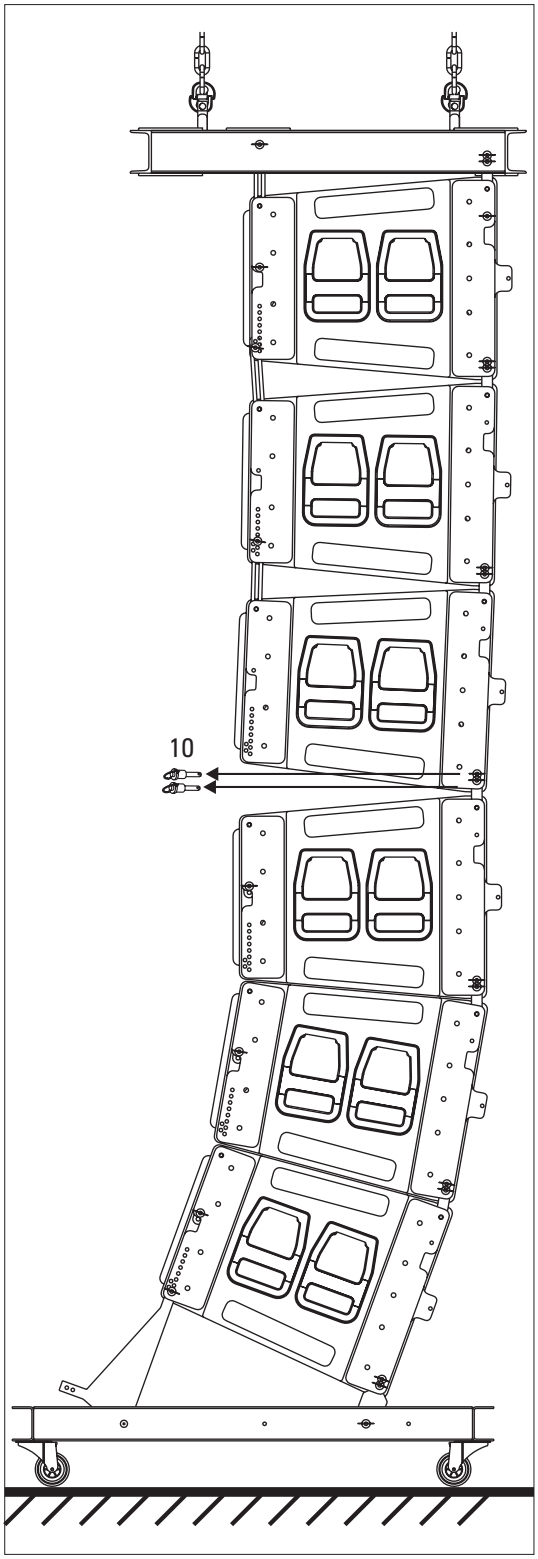
The lowest box is now attached to the platform. Now the array should be lowered until the boxes are resting on one another. When the lower three boxes are in this position, the safety pins attached to the G2A48 guides joining boxes 3 and 4 should be removed to separate the array into two groups of boxes.

On flown systems, boxes are numbered from top to bottom, the top box being number 1 and the lower box being number six.



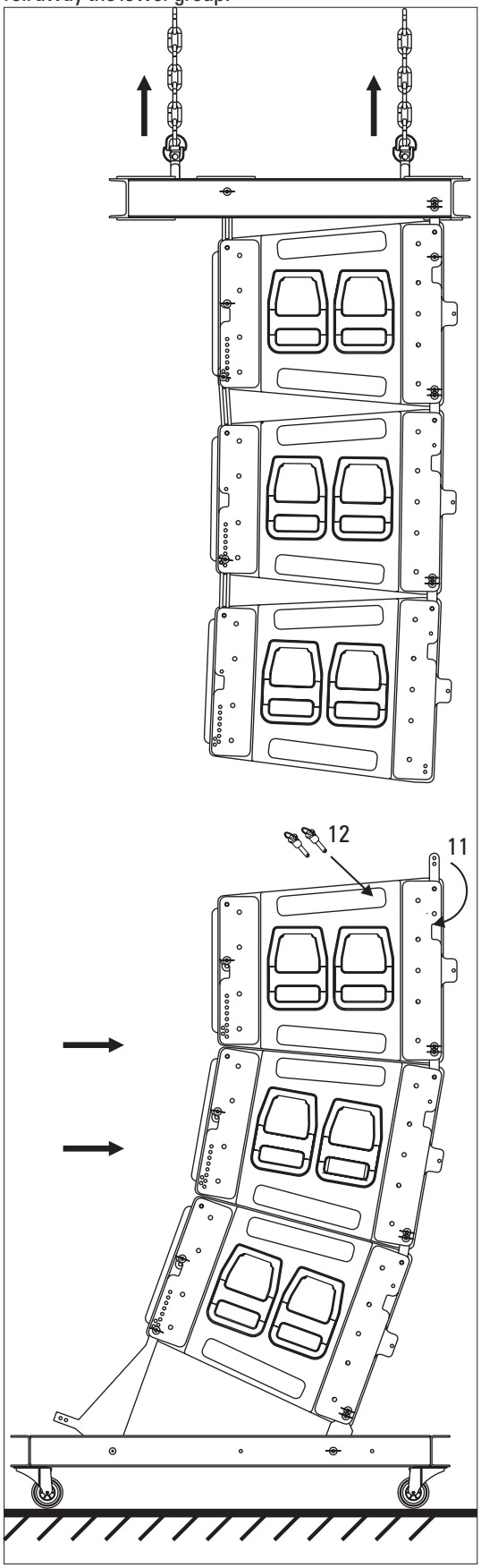
With the number 4, 5 & 6 boxes resting on each other, the safety pins that define the splay angle can be removed (8) and the PL-48S_2 guides can return to their stored position (9). It is mandatory to remove the safety pins between boxes 3-4, but between 4-5, and 5-6, they can be left in place with the angle prepared for the next event.

Boxes 3-4 should be separated at the front by removing the safety pins (10) that secure the G1A48 guides.

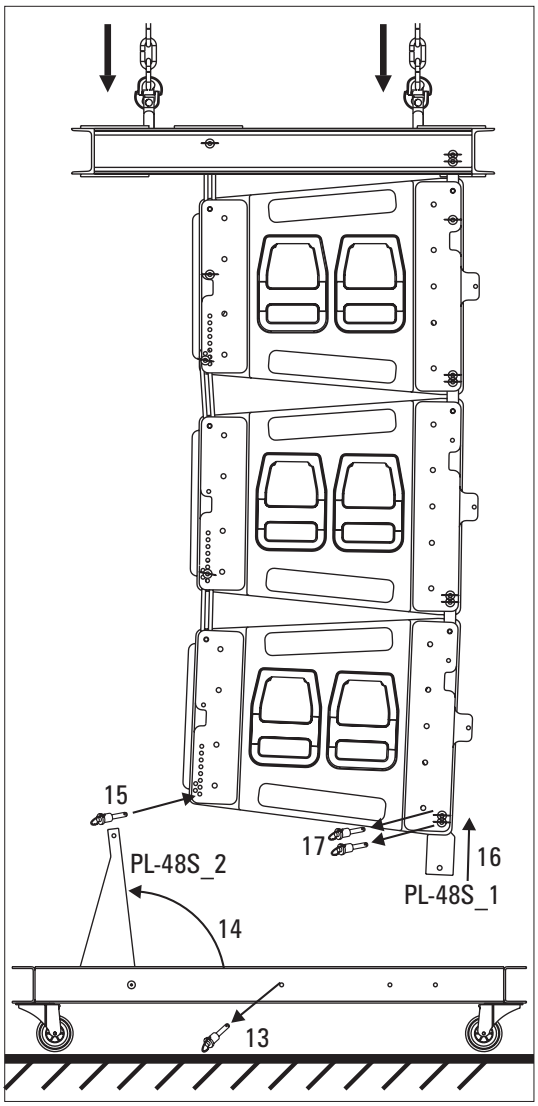


When the G1A48 pieces have been freed, they should be turned (11) and stored (12) within the corresponding box, in this case number 4, using the mechanism included in the rigging hardware.

The first group of boxes has now been freed and is stacked safely on the PL-48S platform. To move the stack, slightly raise the upper group of boxes and roll away the lower group.



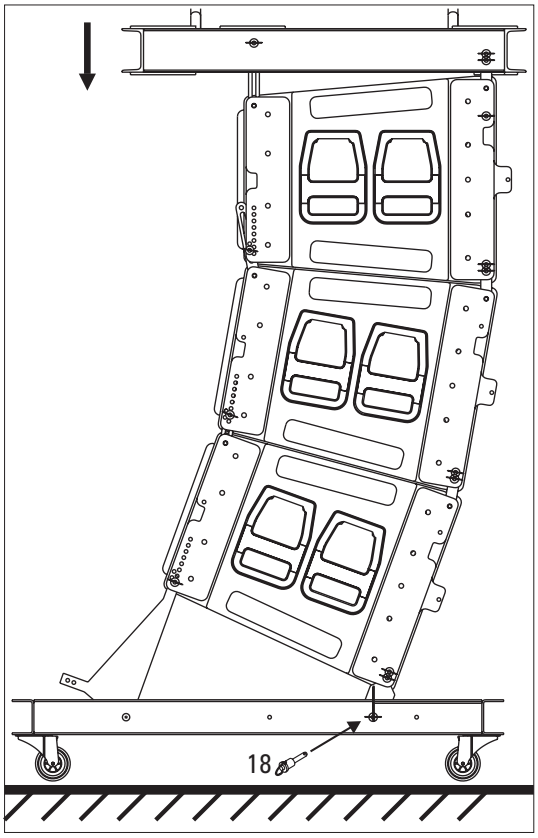
The next step is to roll under the remaining boxes, an empty PL-48S and lower the boxes until they are within close proximity of the platform. The procedure should now be repeated, freeing the PL-48S_2 pieces (13) from the platform, turning them (14) and securing them (15) to the rear rigging hardware of the number 3 box.



Continue lowering the systems and secure (16) the PL-48S_1 pieces to the front rigging points of box 3, inserting 2 safety pins in each (17).

Whenever a safety pin is inserted, it is recommended that they be checked to make sure that they are correctly attached. Pull the safety pin outward to make sure that it is in the locked position.

The last step consists of lowering the remaining array so that the safety pins can be inserted (18) into the holes of the PL-48S_1 pieces and the platform.



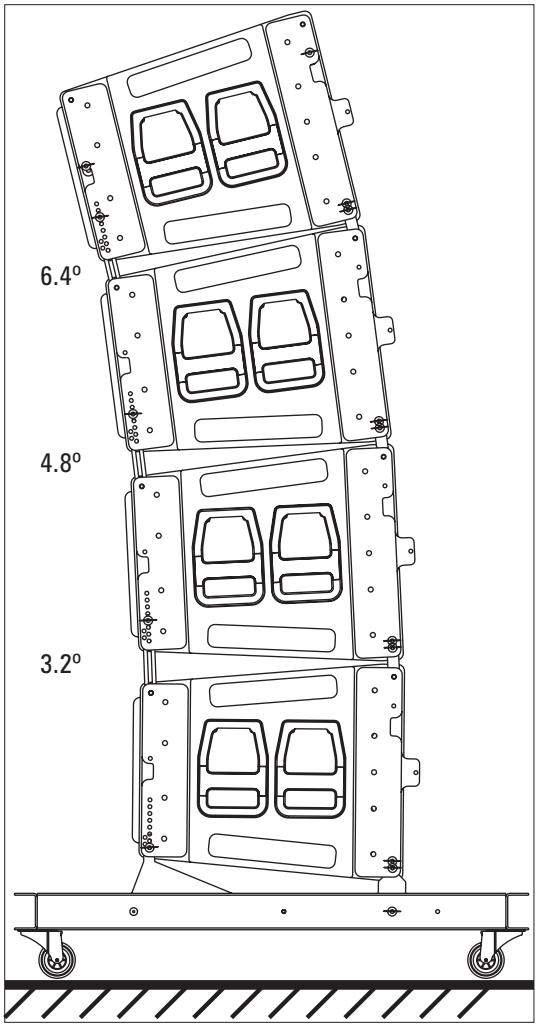
As in the case of the first group of boxes, it is not necessary to remove the safety pins securing the G2A48 guides which determine splay angle. They can remain in as they are, ready for the next event. The same goes for the AX-AERO48 grid.

B) Stacked units (MAX. 4 units):

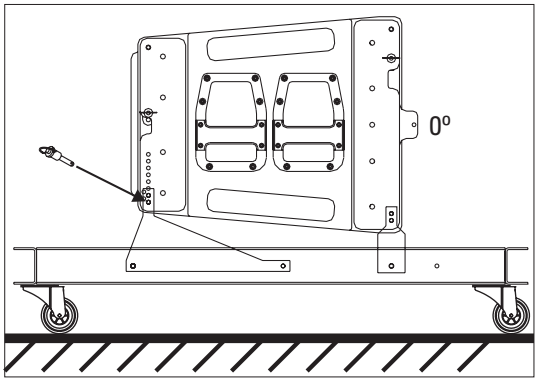
Besides using the PL-48S platform for transporting and flying the systems, it can also be used for ground stacking. Due to the weight of the boxes, it is recommended that they be flown first and then lowered to the platform and stacked. For stability reasons, it is recommended that no more than 4 boxes be stacked. In the event that 4 boxes are used, they should be arranged so that the splay angles do not make the platform unstable. Once the boxes are flown, they can be lowered onto the PL-48S platform by using the hoists to position the array so that the safety pins can be inserted into the G2A48 guides.

The PL-48S_2 piece on the platform has 2 holes, the lower one offers a 0º angle between box and platform and the upper hole offers a 1.6º angle, meaning that the box is leaning forward.

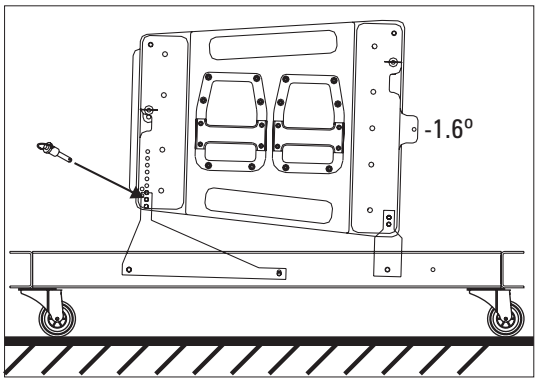
The arrangement in the following picture is an unstable one. The smaller the splay angle between cabinets, the more the stability. Obviously, the most reliable stack in terms of stability is the one when the splay angle between all of the cabinets is 0º.



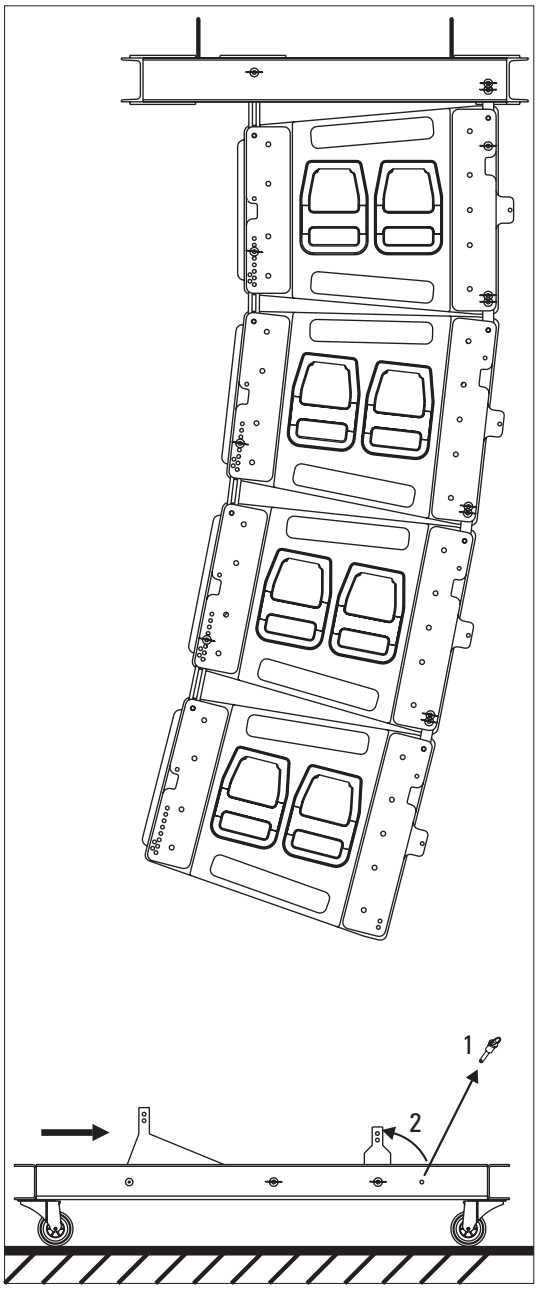
As mentioned above, the hole in which the safety pin is inserted in the PL-48S piece will determine the splay angle of the bottom box, be it 0º or -1.6º. The following pictures will make things more clear.



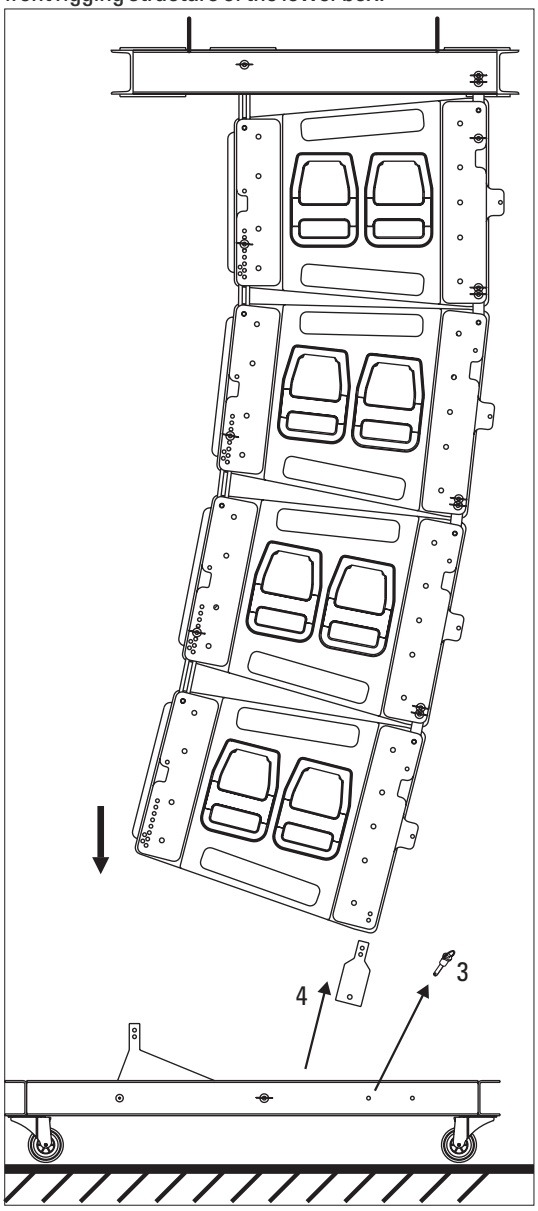
The angle between the box and the platform will be 0º when the safety pin is inserted in the hole on the bottom of the back guide, and the hole on the bottom of the PL-48S_2 piece.



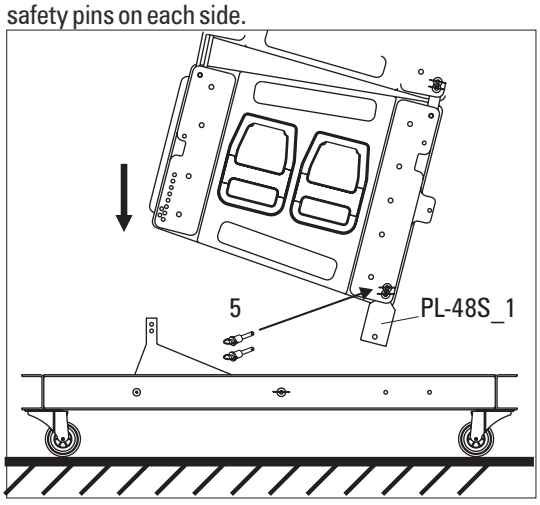
The angle between the box and the platform will be -1.6º when the safety pin is inserted in the hole on the bottom of the back guide, and the hole on top of the PL-48S_2 piece. Let us go now through the complete process of stacking the boxes after they have been previously flown.



After having rolled a PL-48S platform under the array, the PL-48S_1 pieces (1,2 and 3) must be detached from the platform and introduced (4) in the front rigging structure of the lower box.

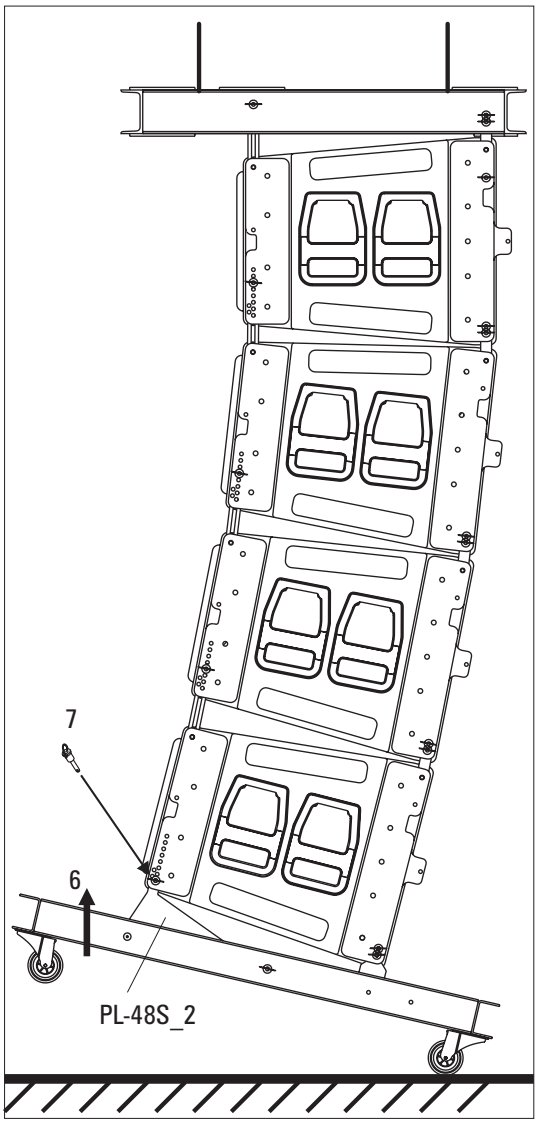


Both PL-48S_1 pieces must now be attached (5) to the box on the bottom by means of two safety pins on each side.



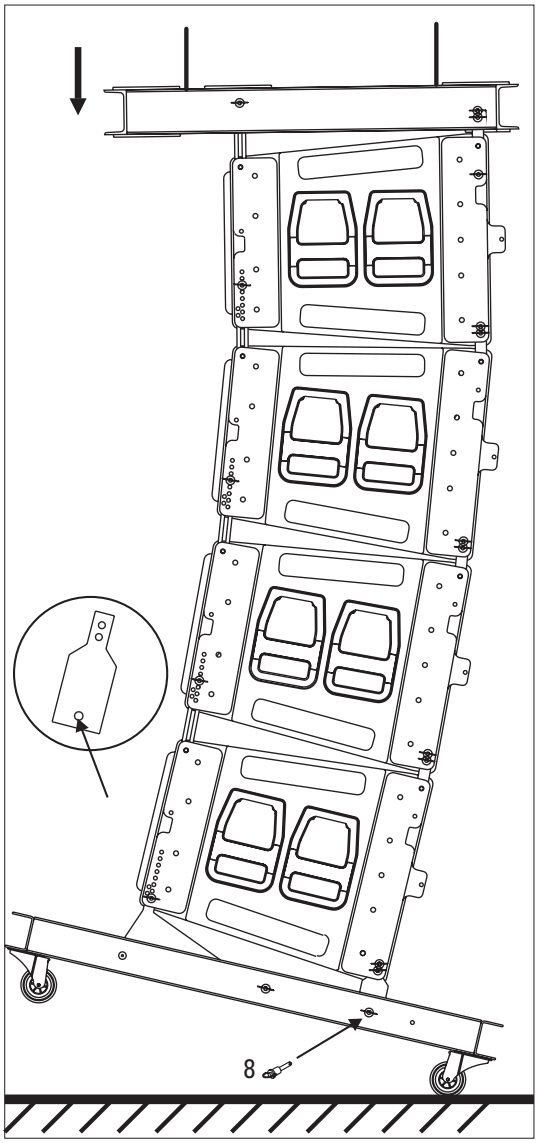
Now the entire cluster can be lowered so the PL-48S_1 pieces get into reach of the platform.

The next step is to fix the PL-48S_2 pieces to the rear rigging hardware of the box. In order to do so, the platform should be raised up till the bottom hole in the rigging hardware and the hole in the PL-48S_2 match together. Then the safety pins can be inserted in the holes. As has been said before, the splay angle between the platform and the box is given by the hole used in the PL-48S_2 piece.

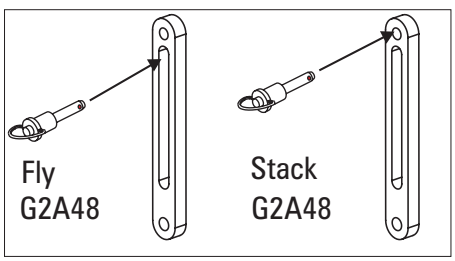


The hole chosen in this example, is the one on the bottom of the PL-48S piece, being 0º the angle.

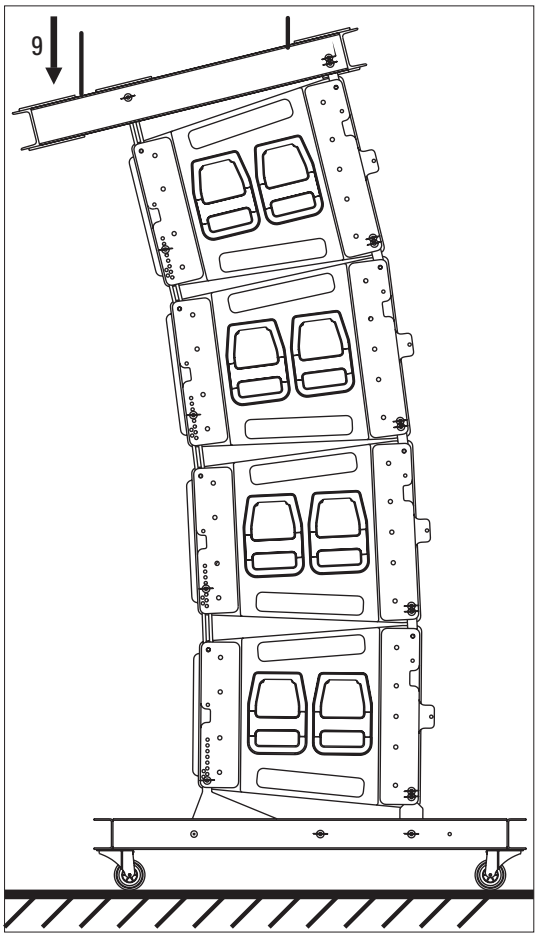
At this point the PL-48S_1 and the PL-48S_2 pieces are both connected to the box. There is only the PL-48S_1 piece left to be attached to the platform. Move the platform upwards till the holes in the PL-48S_1 piece and the holes in the platform match together. Then insert the safety pins (8).

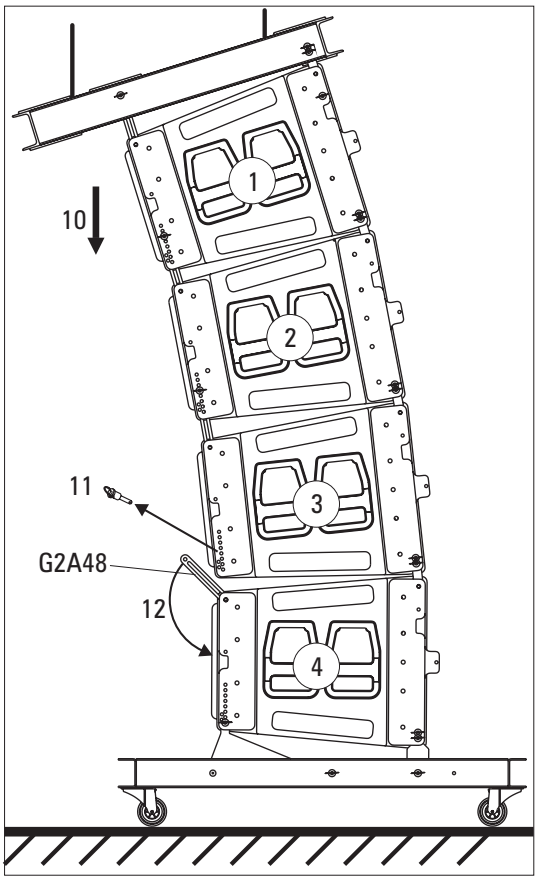


When the boxes are flown the safety pins must be inserted in the G2A48 slots. Now we want to stack the boxes, so the next step is to release the pins from the slots and introduce them in the G2A48 holes. It must be done by first lowering the boxes till the safety pins can be removed, then raise the boxes till the holes fit together and finally insert the safety pins again.

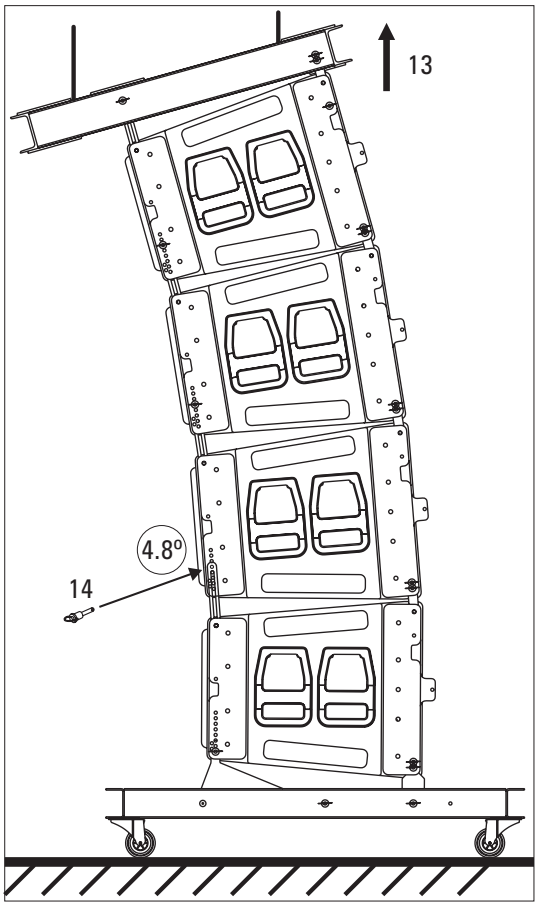


Lower the cluster till the platform is resting on the floor.





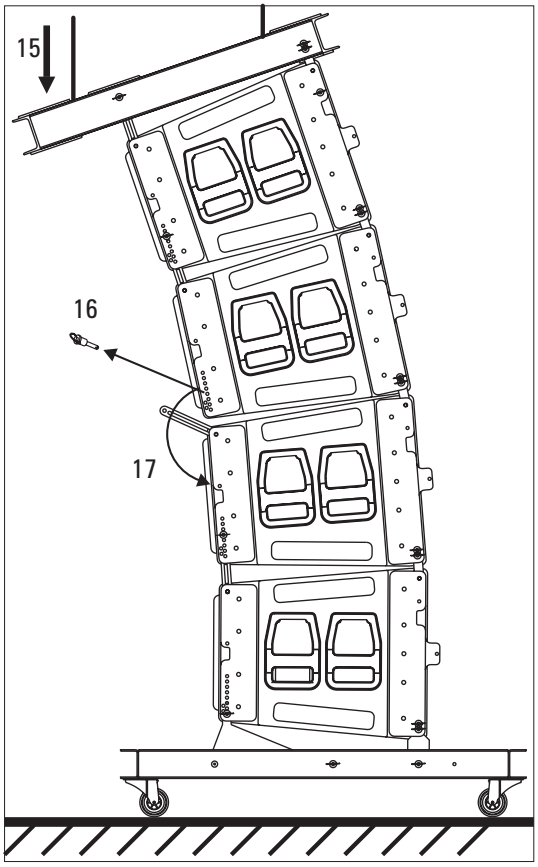
The cluster must now be lowered (10) until the safety pins (11) on the rear side of box number 4 can be removed. Once safety pins have been released the cluster must be raised or lowered (13) until the hole in the G2A48 piece matches with the hole that determines the angle chosen by the user.

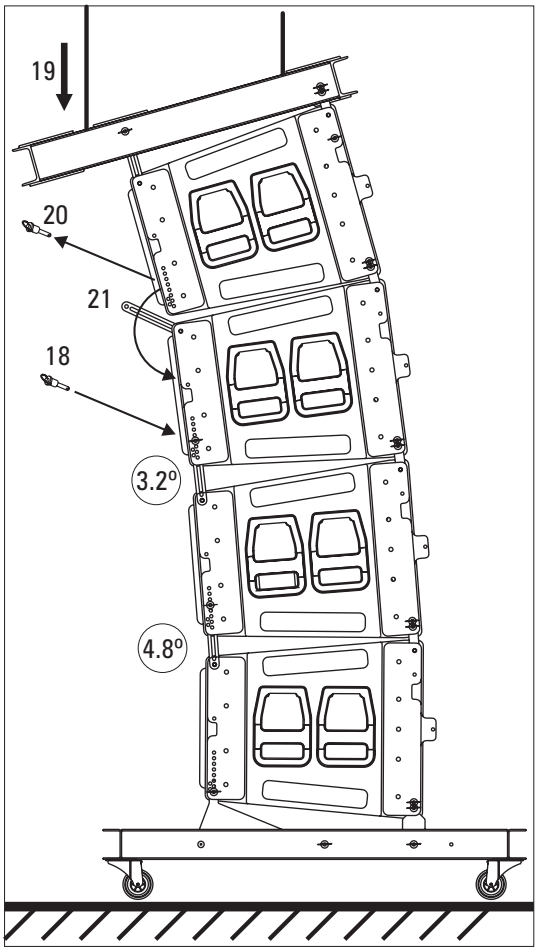


Safety pins can now be inserted (14). In this example, the set up angle between boxes 3 and 4 is 4.8º.

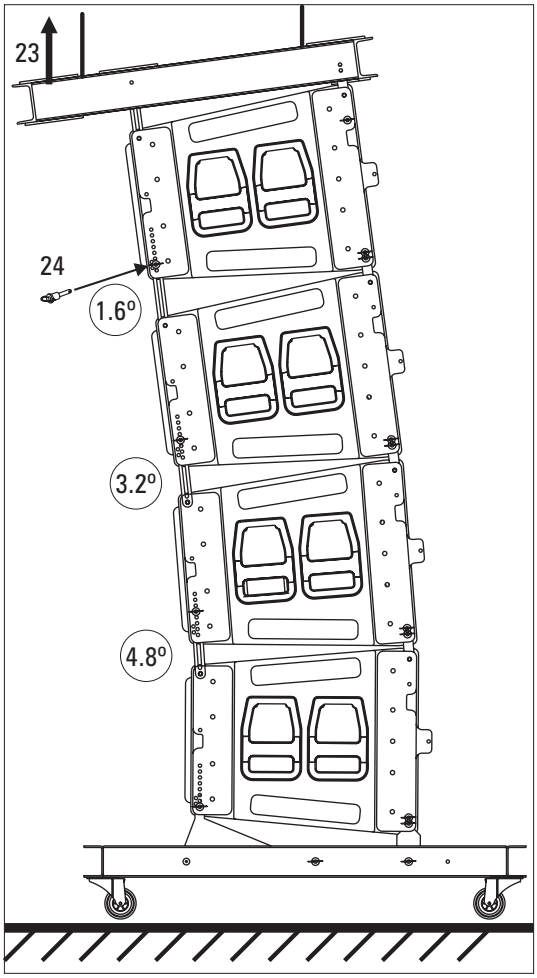
<u>It is important to check that pins cannot be removed by pulling outward and that they have been inserted in the G2A48 hole instead of the guide slot. Otherwise the box would not remain in the expected angle.</u>

The procedure is the same for the next boxes. The cluster must be lowered again (15) until the safety pins of box 3 are loose. Remove the pins (16) so the G2A48 rear guides return to their stored position (17). Insert the safety pins into the holes (18) that determine the angle previously selected for stacking. Repeat the same procedure with box number 1: lower the cluster (19), free the rear guides G2A48 (20 & 21) and select the angle.





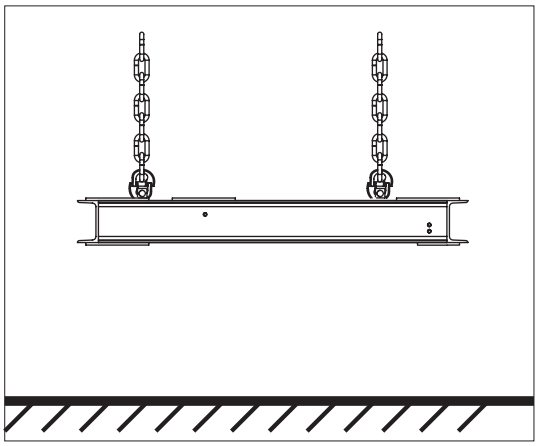
In order to set up the angle between boxes 1 and 2 you must pull up (23) from the grid until the hole in the G2A48 piece fits with the hole that determines the stacking angle. Then insert the safety pins (24).



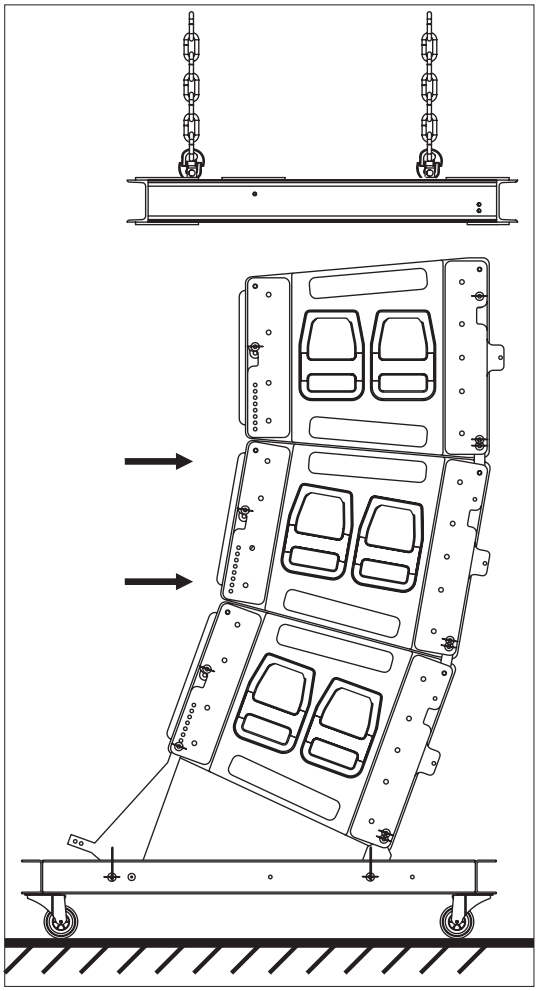
At this point the boxes are safely stacked. Finally, the AX-AERO48 grid should be detached from box number 1.

3.6 ASSEMBLING A CLUSTER USING THE PL-48S PLATFORM

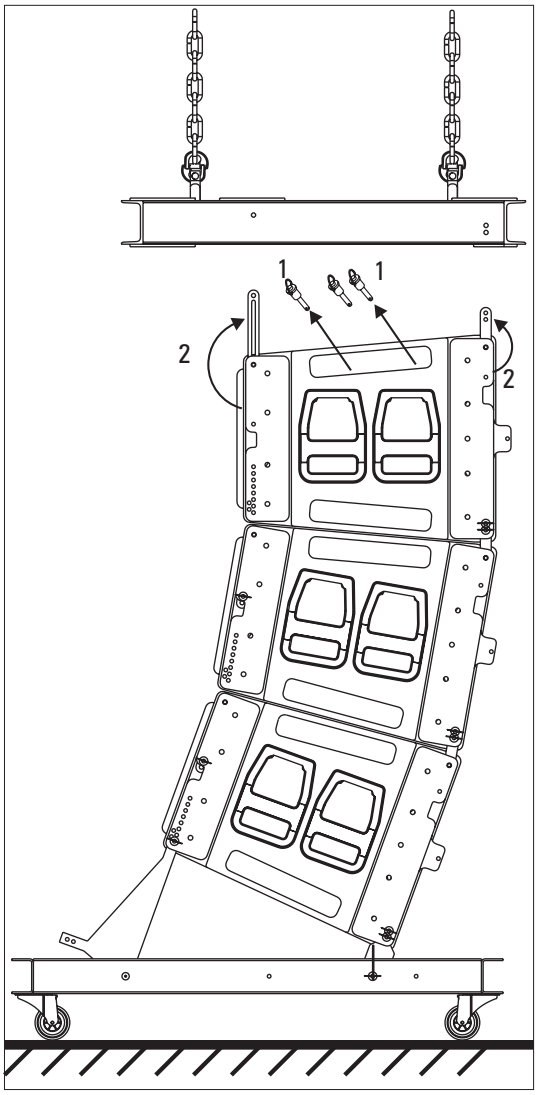
AERO-48 boxes can be easily transported in groups of three when stacked on the PL-48S platform. This arrangement is also useful and saves time when setting up a cluster. Let us see what would the procedure be when flying a six box cluster.



After the AX-AERO48 grid has been attached to the motors, it should be lifted at about 1.8m (5.5 ft) from the ground. Now the platform containing the first three stacked AERO-48 boxes can be rolled under the grid.

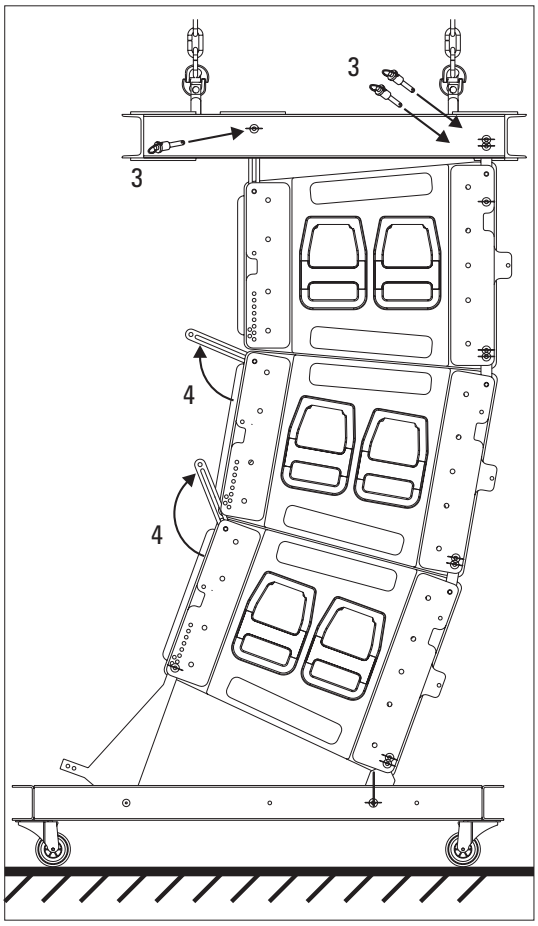


In order to attach the box on top to the grid, front guides G1A48 and rear guides G2A48 must be swung (2) and inserted into the AX-AERO48 grid receiving points. Once this has been done, detach the 6 safety pins from their receptacles and secure the box to the grid.

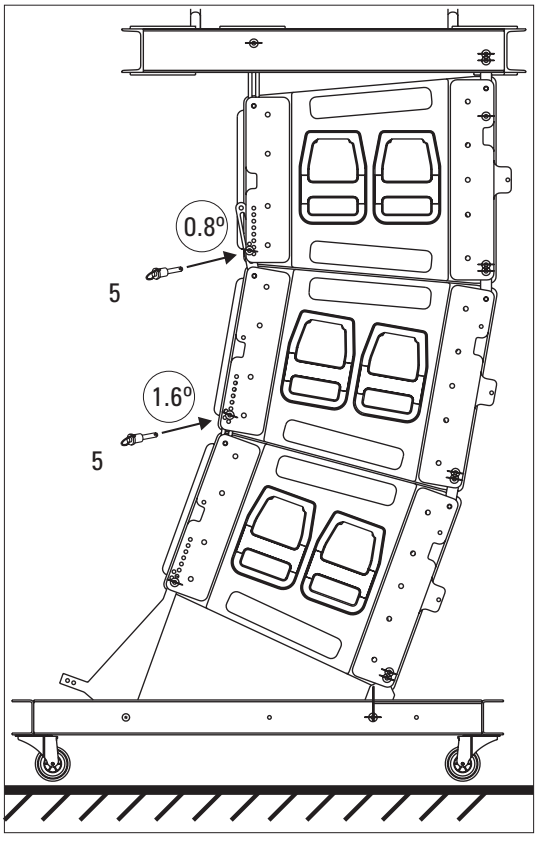


Once G1A48, G2A48 of the top cabinet have been secured (3) to the grid, rotate the G2A48 pieces (4), fit them into the upper box rigging hardware and secure them with the safety pins (5). See next page.

Whenever a safety pin is inserted, it is always advisable to make sure it has been correctly locked by pulling outward.

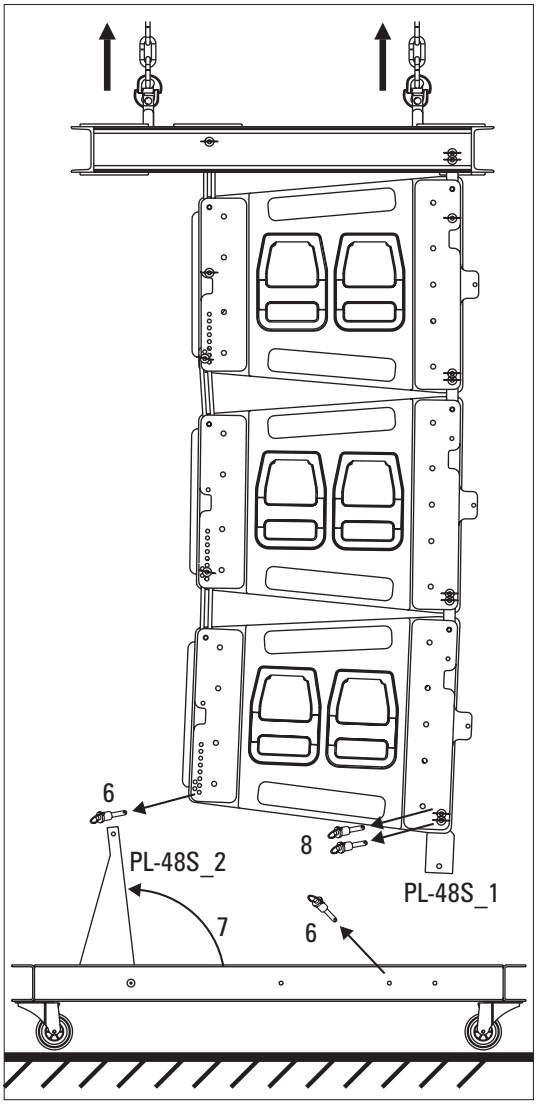


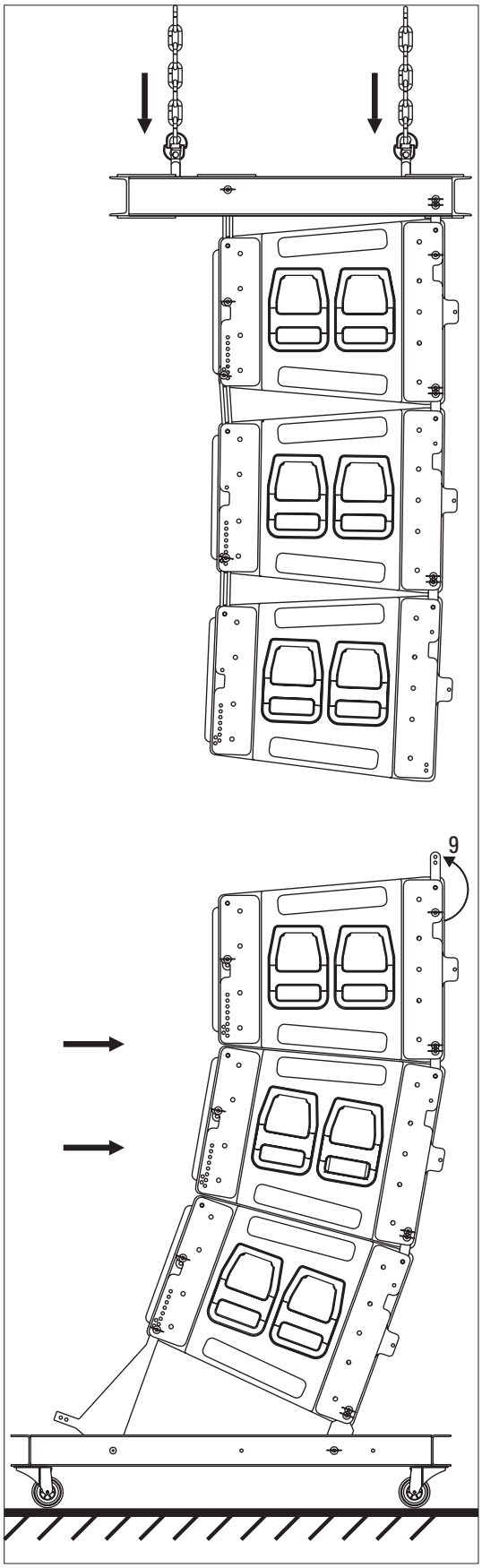
Select the angle between cabinets introducing (5) the pins in the holes of the rigging system through the slot of G2A48.



The angles that can be seen in the example are 0.8º between the first and second boxes, and 1.6º between the second and the third boxes. The cluster can now be lifted by the two motors, and the PL-48S platform detached.

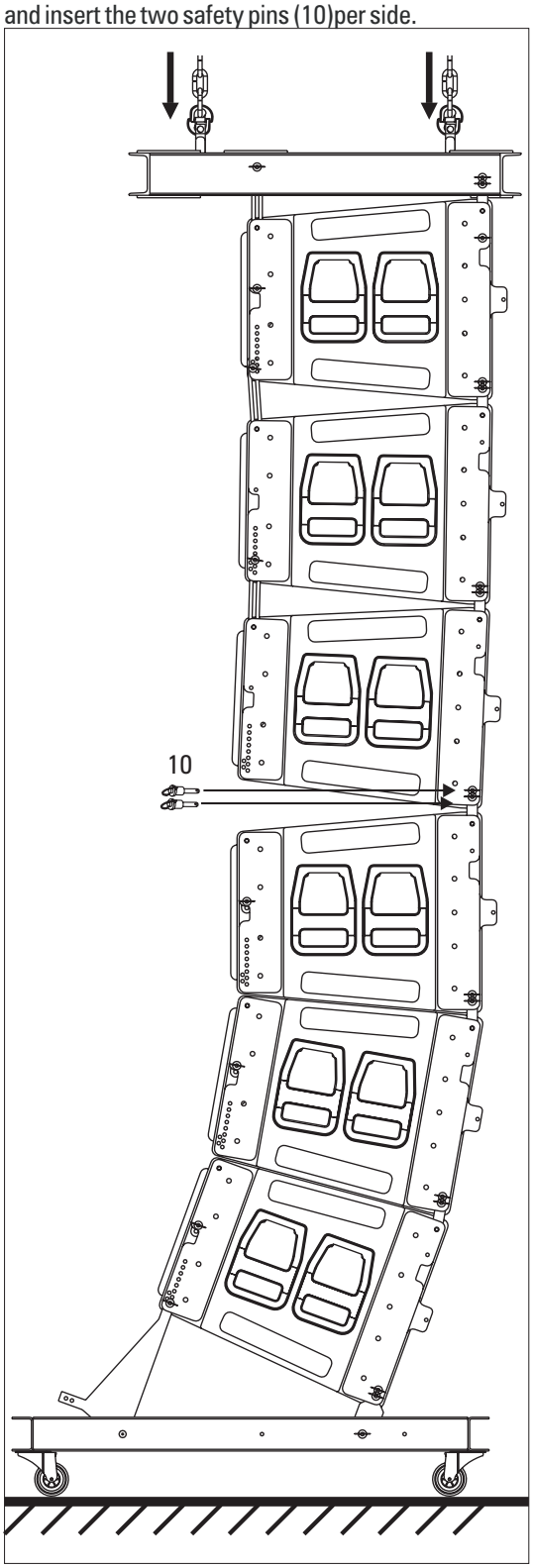
The first step to detach the PL-48S platform from the bottom box is to release (6) the safety pins which secure the PL-48S_1 piece to the platform and the PL-48S_2 piece to the box. After raising the cluster a bit, the safety pins which connect the PL-48S_1 piece to the box can be released (8) also. PL-48S_1 piece should now be reattached again to the platform.



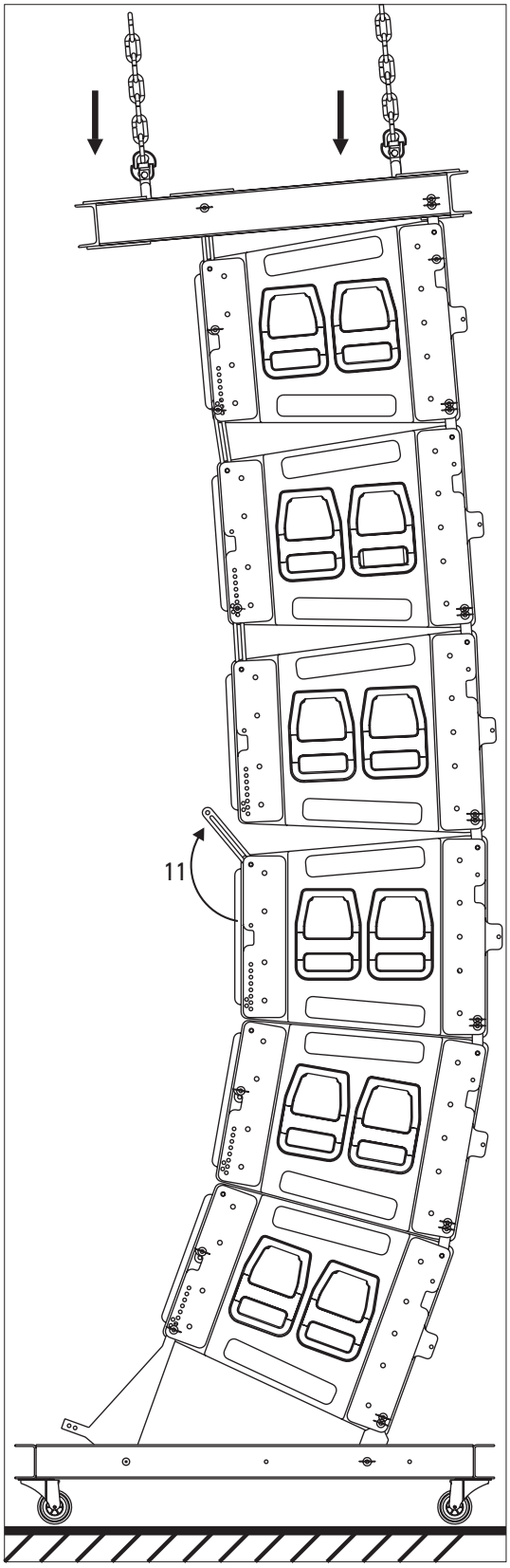


Place the remaining group of boxes under the cluster, then lower the cluster until both front sides get in close proximity. G1A48 front guides (9) of the first box on the platform can now be swung and left in the upright position, ready to be inserted into the front rigging hardware of the next box.

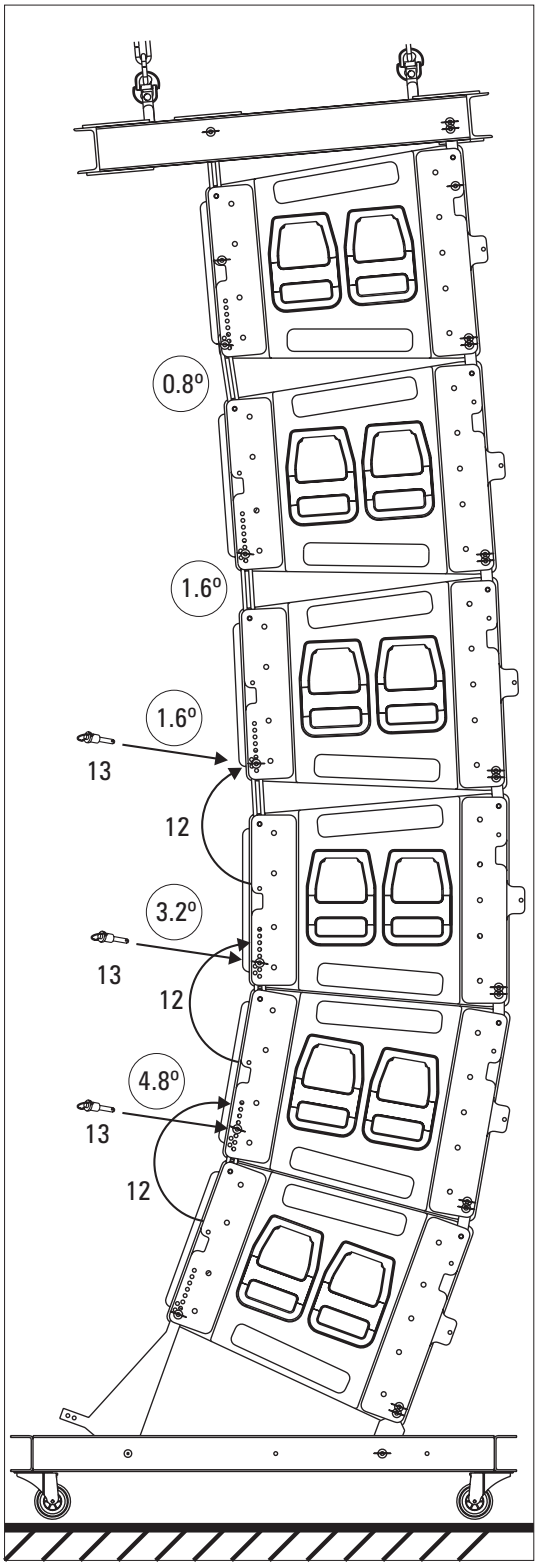
Lower the cluster until the G1A48 front guides fit into the rigging hardware of the bottom box and insert the two safety pins (10)per side.



With the front guides correctly secured, swing the G2A48 (11) rear guides belonging to the box on top of the second group and lower the grid till the guides fit into the rigging hardware of the next box. Set the angle between both boxes by inserting the safety pins in the correct hole.



From here on, the process is similar to the previously described. Detach the safety pins from their receptacles on the sides of the boxes, swing (12) the G2A48 rear guides, place them into the rigging hardware of the next box and insert (13) the safety pins in the holes which define the angle previously selected.



4. SIGNAL PROCESSING

The use of the DSP-3VS digital processor is highly recommended when running the AERO-48 sound system, and the use of the DSP-1Sub when running the AERO-218Sub. Whenever another loudspeaker management system is going to be used, it should be configured with the parameters provided by the manufacturer. Not doing so may damage the system´s speaker components and affect the sound quality.

The DSP-3VS digital processor is a three-way crossover with gain controls that offer +/- 6dB variation per way. The processor has two inputs and six outputs with level indication and muting for each of the outputs. The digital processor includes fourth order filters and parametric equalizers. The user adjustable limiters are accessible from the front panel.

The DSP-3VS includes 10 presets that can be selected from the front panel. Each preset memory recalls specific operating parameters for a specific DAS speaker systems. The selected program is visible on the LCD screen located on the front panel.

4.1 DSP-3VS INSTRUCTIONS

To select a program, turn the rotary mini-DIP switch on the front panel labelled "Presets". The name of the recalled preset will appear on the LCD screen. The first time the DSP-3VS is connected, the number 1 program for the AERO-48 system will appear on the front panel screen.

To select the limit levels for each of the ways, turn the rotary mini-DIP switches on the front panel labelled "Limiters". The limit level expressed in Vrms and dBu appears on the front panel screen.

The "Settings" button allows the user to check the saved limit levels. The limit levels appear on the screen and after 5 seconds, the preset program returns to the screen.

The limit levels to be entered should be equal to or lower than the sensitivity of the amplifiers used. Amplifier manuals provide the sensitivity at 8 Ohms and 4 Ohms. Take into account the load impedance at which the amplifiers will be working when adjusting the limit levels.

When using amplifiers with a greater output power than that recommended by the speaker manufacturer, the limit levels should be adjusted so not to exceed the power capabilities of the speakers.

4.2 LIMITER SETTINGS

The following formulas can be used to establish the limiter voltage:

Amplifier Data:

$V_{rms} = \sqrt{P_{rms} * Z}$
$G = V_{rms}/S$
$G_{dB} = 20\log(V_{rms}/S)$

- Where P_{rms} is the amplifier RMS power in watts
- Z is the load impedance in ohms
- G is the amplifier gain
- S is the amplifier sensitivity in volts
- G_{dB} is the amplifier gain in dB

Limiter settings:

$V_d = \sqrt{P_d * Z}$
Limit level (v) = V_d/G
Limit level (dBu) = 20log[limit level (v)/0.775]

- Where P_d is the maximum power to be delivered in watts

Ejemplo:

	Amplifier	
P_{rms}	1400W@4ohm	850W@8ohm
G_{dB}	32dB	
G	40 X	
S	1.84 volts@4ohm	2 volts@8ohm

In this example we are going to feed the highs of an AERO-48 with one amplifier channel. Total impedance of 4 M-10N high frequency drivers, as wired in the AERO48, is 8 Ohms. The maximum rms power to be delivered to the highs, or Pd, should be 700W (700/4 = 175W per driver).

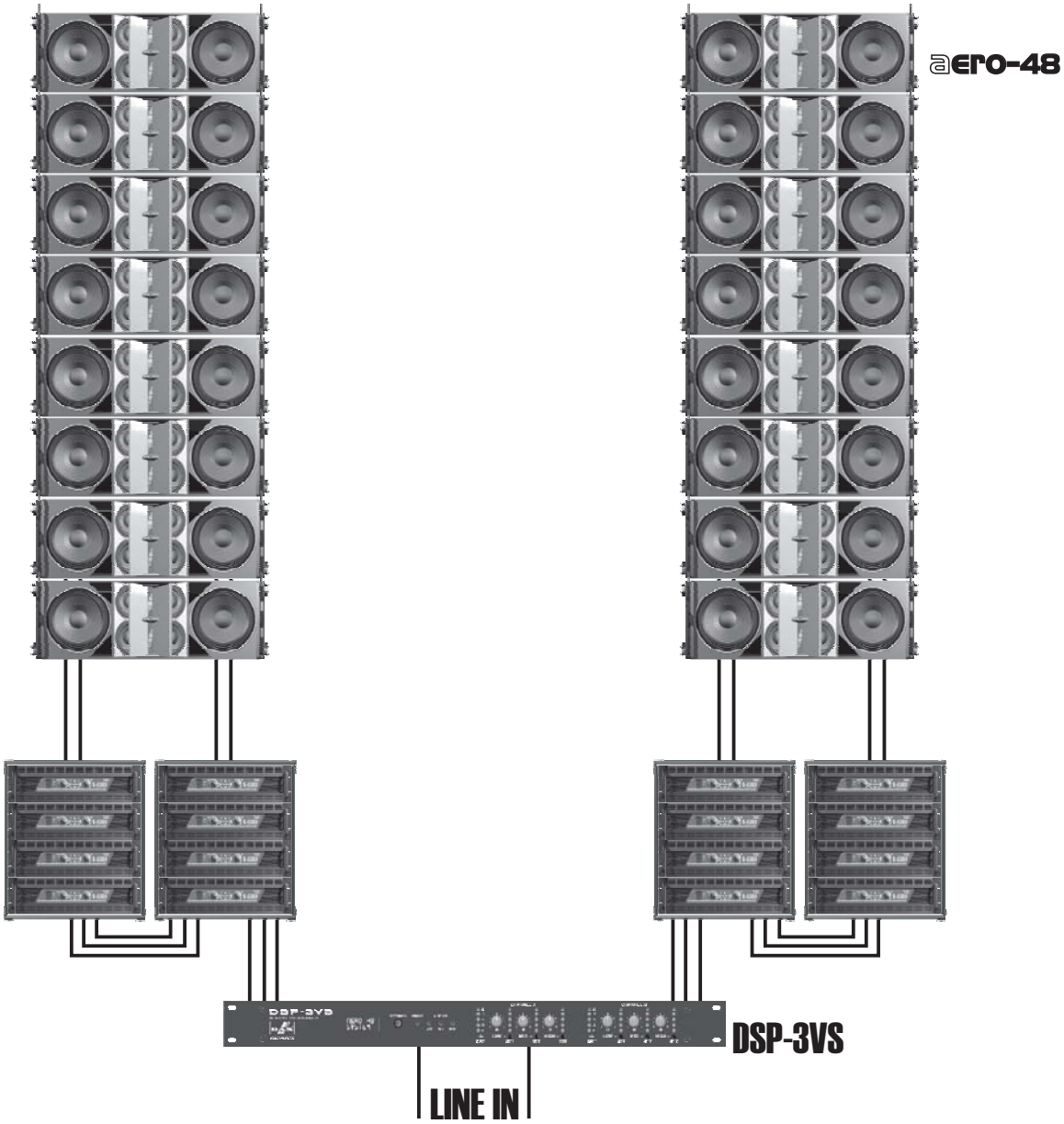
$P_d = 700W@8ohm$
$V_d = \sqrt{700*8} = 74.8v$

Limit level (v) = V_d/G = 74.8/40 = 1.84
Limit level (dBu) = 20log(1.84/0.775) = 7.6

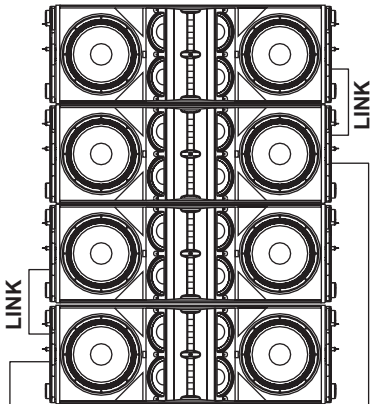
Important Notice: The programs stored in the memories of the DSP-3VS have been designed to provide optimum performance and balance between the different ways. In order to maintain this balance, equal gain amplifiers should be used.

5. SYSTEM CONNECTION

CONFIGURATION 1 (3 WAY STEREO SYSTEM FOR MID-LARGE SIZED VENUES)



CONNECTIONS



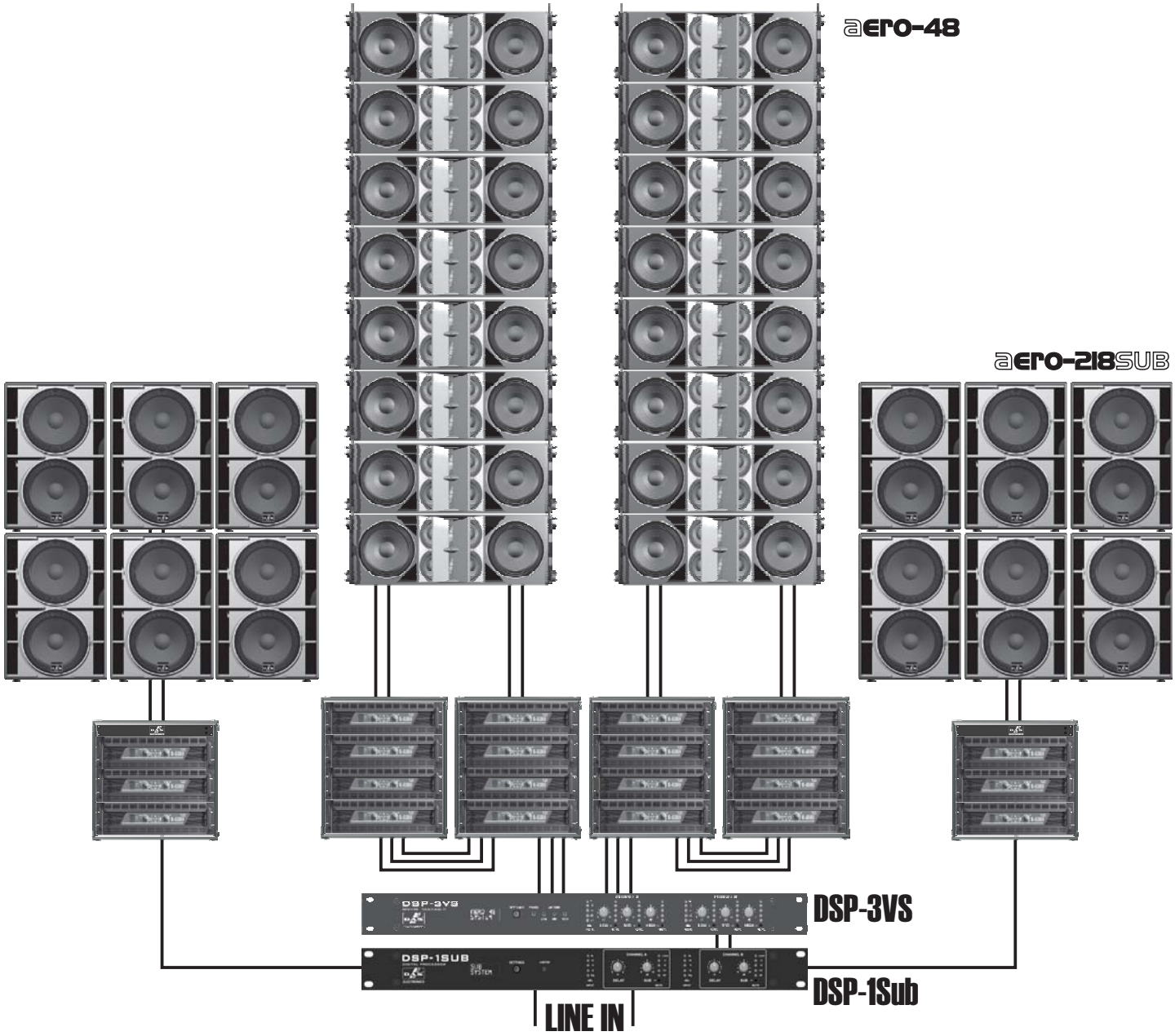
RECOMMENDED AMPLIFIERS

CH-A		CH-B
±4HF	2 x 600W@8ohm	±4HF
±3MF	2 x 1200W@4ohm	±3MF
±2LF2	2 x 1200W@4ohm	±2LF2
±1LF1	2 x 1200W@4ohm	±1LF1

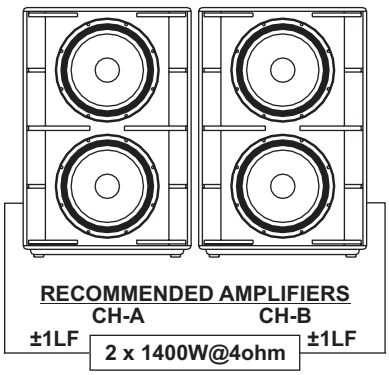
DSP-3VS OPERATING PARAMETERS

	LOW	MID	HIGH
GAIN	0 dB	0 dB	-7 dB
DELAY	0.4 ms	0.4 ms	0 ms
POLARITY	Normal	Normal	Invert
LOW-CUT	30 Hz LR-24	158 Hz LR-24	1 kHz LR-24
HIGH-CUT	158 Hz LR-24	1 kHz LR-24	
EQ.1 FREQ.	50 Hz	353 Hz	2.5 kHz
EQ.1 LEVEL	+6 dB	-2 dB	-3 dB
EQ.1 BW.	0.8 oct (Q=1.8)	0.3 oct (Q=4.8)	0.35 oct (Q=4.1)
EQ.2 FREQ.		450 Hz	10.1 kHz
EQ.2 LEVEL		-3dB	+12 dB
EQ.2 BW.		0.8 oct (Q=1.8)	1 oct (Q=1.4)
EQ.3 FREQ.		650 Hz	12.5 kHz
EQ.3 LEVEL		-2dB	+7 dB
EQ.3 BW.		0.3 oct (Q=4.8)	0.3 oct (Q=4.8)

CONFIGURATION 2 (4 WAY STEREO SYSTEM FOR MID-LARGE SIZED VENUES)



CONNECTIONS



DSP-3VS + DSP-1SUB OPERATING PARAMETERS

	SUB	LOW	MID	HIGH
GAIN	+3 dB	0 dB	0 dB	-7 dB
DELAY	Variable	0.4 ms	0.4 ms	0 ms
POLARITY	Normal	Normal	Normal	Invert
LOW-CUT	23 Hz LR-24	50 Hz LR-24	158 Hz LR-24	1 kHz LR-24
HIGH-CUT	85 Hz LR-24	158 Hz LR-24	1 kHz LR-24	
EQ.1 FREQ.	36 Hz	60 Hz	353 Hz	2.5 kHz
EQ.1 LEVEL	+10 dB	+3 dB	-2 dB	-3 dB
EQ.1 BW.	0.4 oct (Q=3.6)	0.8 oct (Q=1.8)	0.3 oct (Q=4.8)	0.35 oct (Q=4.1)
EQ.2 FREQ.			450 Hz	10.1 kHz
EQ.2 LEVEL			-3dB	+12 dB
EQ.2 BW.			0.8 oct (Q=1.8)	1 oct (Q=1.4)
EQ.3 FREQ.			650 Hz	12.5 kHz
EQ.3 LEVEL			-2dB	+7 dB
EQ.3 BW.			0.3 oct (Q=4.8)	0.3 oct (Q=4.8)

6.OPERATING PARAMETERS

AERO-48 BSS OPERATING PARAMETERS

	LOW	MID	HIGH
GAIN	0 dB	0 dB	-7 dB
DELAY	0.4 ms	0.4 ms	0 ms
POLARITY	Normal	Normal	Invert
LOW-CUT	30 Hz LR-24	158 Hz LR-24	1 kHz LR-24
HIGH-CUT	158 Hz LR-24	1 kHz LR-24	
EQ.1 FREQ.	50 Hz	353 Hz	2.5 kHz
EQ.1 LEVEL	+6 dB	-2 dB	-3 dB
EQ.1 BW.	0.8 oct (Q=1.8)	0.3 oct (Q=4.8)	0.35 oct (Q=4.1)
EQ.2 FREQ.		450 Hz	10.1 kHz
EQ.2 LEVEL		-3 dB	+12 dB
EQ.2 BW.		0.8 oct (Q=1.8)	1 oct (Q=1.4)
EQ.3 FREQ.		650 Hz	12.5 kHz
EQ.3 LEVEL		-2 dB	+7 dB
EQ.3 BW.		0.3 oct (Q=4.8)	0.3 oct (Q=4.8)

AERO-48+AERO218SUB BSS OPERATING PARAMETERS

	SUB	LOW	MID	HIGH
GAIN	+3 dB	0 dB	0 dB	-7 dB
DELAY	Variable	0.4 ms	0.4 ms	0 ms
POLARITY	Normal	Normal	Normal	Invert
LOW-CUT	23 Hz LR-24	50 Hz LR-24	158 Hz LR-24	1 kHz LR-24
HIGH-CUT	85 Hz LR-24	158 Hz LR-24	1 kHz LR-24	
EQ.1 FREQ.	36 Hz	60 Hz	353 Hz	2.5 kHz
EQ.1 LEVEL	+10 dB	+3 dB	-2 dB	-3 dB
EQ.1 BW.	0.4 oct (Q=3.6)	0.8 oct (Q=1.8)	0.3 oct (Q=4.8)	0.35 oct (Q=4.1)
EQ.2 FREQ.			450 Hz	10.1 kHz
EQ.2 LEVEL			-3 dB	+12 dB
EQ.2 BW.			0.8 oct (Q=1.8)	1 oct (Q=1.4)
EQ.3 FREQ.			650 Hz	12.5 kHz
EQ.3 LEVEL			-2 dB	+7 dB
EQ.3 BW.			0.3 oct (Q=4.8)	0.3 oct (Q=4.8)

AERO-48 XTA OPERATING PARAMETERS

	LOW	MID	HIGH
GAIN	0 dB	0 dB	-8.8 dB
DELAY	0.4 ms	0.4 ms	0 ms
POLARITY	Normal	Normal	Invert
LOW-CUT	29.5 Hz LR-24	157 Hz LR-24	1 kHz LR-24
HIGH-CUT	157 Hz LR-24	1000 Hz LR-24	22 kHz LR-24
EQ.1 FREQ.	50.6 Hz	354Hz	2.52 kHz
EQ.1 LEVEL	+5.5 dB	-2 dB	-3 dB
EQ.1 BW.	0.67 oct (Q=2.1)	0.28 oct (Q=5.1)	0.32 oct. (Q=4.5)
EQ.2 FREQ.		454 Hz	10.3 kHz
EQ.2 LEVEL		-3 dB	+13.8 dB
EQ.2 BW.		0.75 oct (Q=1.9)	0.6 oct (Q=2.4)
EQ.3 FREQ.		655 Hz	12.7 kHz
EQ.3 LEVEL		-2 dB	+5.5 dB
EQ.3 BW.		0.27 oct (Q=5.3)	0.17 oct (Q=8.5)

AERO-48+AERO218SUB XTA OPERATING PARAMETERS

	SUB	LOW	MID	HIGH
GAIN	+3 dB	0 dB	0 dB	-8.8 dB
DELAY	Variable	0.4 ms	0.4 ms	0 ms
POLARITY	Normal	Normal	Normal	Invert
LOW-CUT	20.9 Hz LR-24	49.6 Hz LR-24	157 Hz LR-24	1 kHz LR-24
HIGH-CUT	83.4 Hz LR-24	157 Hz LR-24	1000 Hz LR-24	22 kHz LR-24
EQ.1 FREQ.	34.4 Hz	59 Hz	354Hz	2.52 kHz
EQ.1 LEVEL	+10 dB	+2.5 dB	-2 dB	-3 dB
EQ.1 BW.	0.36 oct (Q=4)	0.79 oct (Q=1.8)	0.28 oct (Q=5.1)	0.32 oct. (Q=4.5)
EQ.2 FREQ.			454 Hz	10.3 kHz
EQ.2 LEVEL			-3 dB	+13.8 dB
EQ.2 BW.			0.75 oct (Q=1.9)	0.6 oct (Q=2.4)
EQ.3 FREQ.			655 Hz	12.7 kHz
EQ.3 LEVEL			-2 dB	+5.5 dB
EQ.3 BW.			0.27 oct (Q=5.3)	0.17 oct (Q=8.5)

One of the most important parts of a multi-way sound reinforcement system is the digital controller. There are a lot of fine products available; D.A.S. Audio has selected the following ones apart from the DSP-3VS, DSP-1Sub D.A.S. controllers:

Company	*BSS Audio*	*XTA Electronics*
Model	**FDS 336 Omnidrive**	**DP 226**

7. POWERING THE SYSTEM

The following tables present power data delivered to each component and limiter settings depending on the amplifier model:

D.A.S H-4000 AMPLIFIER GAIN 40x / 32 dB

AMPLIFIER CONFIGURATION: 4 x AERO-48 / 4 x H-4000

AMPLIFIER CHANNEL	SPEAKON NL8 PINS	NUMBER OF SPEAKERS	LOAD IMPEDANCE	POWER AT NOMINAL IMPEDANCE	RECOMMENDED LIMITATION	POWER PER SPEAKER	LIMITER V /dBu
CH-1 Amplif. 4(HF) CH-2	PINS ±4	4 x M-10N	8 Ω	850 W	700 W / 8 Ω	175 W	1.84 / 7.6
	PINS ±4	4 x M-10N	8 Ω	850 W	700 W / 8 Ω	175 W	1.84 / 7.6
CH-1 Amplif. 3(MF) CH-2	PINS ±3	8 x 8MN	4 Ω	1400 W	1400 W / 4 Ω	175 W	1.84 / 7.6
	PINS ±3	8 x 8MN	4 Ω	1400 W	1400 W / 4 Ω	175 W	1.84 / 7.6
CH-1 Amplif. 2(LF) CH-2	PINS ±2	2 x 15GN	4 Ω	1400 W	1400 W / 4 Ω	700 W	1.84 / 7.6
	PINS ±2	2 x 15GN	4 Ω	1400 W	1400 W / 4 Ω	700 W	1.84 / 7.6
CH-1 Amplif.1(LF) CH-2	PINS ±1	2 x 15GN	4 Ω	1400 W	1400 W / 4 Ω	700 W	1.84 / 7.6
	PINS ±1	2 x 15GN	4 Ω	1400 W	1400 W / 4 Ω	700 W	1.84 / 7.6

D.A.S E-20 AMPLIFIER GAIN 40.6x / 31.5 dB

AMPLIFIER CONFIGURATION: 4 x AERO-48 / 4 x E-20

AMPLIFIER CHANNEL	SPEAKON NL8 PINS	NUMBER OF SPEAKERS	LOAD IMPEDANCE	POWER AT NOMINAL IMPEDANCE	RECOMMENDED LIMITATION	POWER PER SPEAKER	LIMITER V /dBu
CH-1 Amplifier 4(HF) CH-2	PINS ±4	4 x M-10N	8 Ω	600 W	600 W / 8 Ω	150 W	1.84 / 7.6
	PINS ±4	4 x M-10N	8 Ω	600 W	600 W / 8 Ω	150 W	1.84 / 7.6
CH-1 Amplifier 3(MF) CH-2	PINS ±3	8 x 8MN	4 Ω	1000 W	1000 W / 4 Ω	125 W	1.65 / 6.6
	PINS ±3	8 x 8MN	4 Ω	1000 W	1000 W / 4 Ω	125 W	1.65 / 6.6
CH-1 Amplifier 2(LF) CH-2	PINS ±2	2 x 15GN	4 Ω	1000 W	1000 W / 4 Ω	500 W	1.65 / 6.6
	PINS ±2	2 x 15GN	4 Ω	1000 W	1000 W / 4 Ω	500 W	1.65 / 6.6
CH-1 Amplifier 1(LF) CH-2	PINS ±1	2 x 15GN	4 Ω	1000 W	1000 W / 4 Ω	500 W	1.65 / 6.6
	PINS ±1	2 x 15GN	4 Ω	1000 W	1000 W / 4 Ω	500 W	1.65 / 6.6

AERO-48

aero series

FEATURES

- THREE-WAY, HIGH DIRECTIVITY LINE ARRAY MODULE
- 2 x 15" LOW FREQUENCY NEODYMIUM CONE TRANSDUCERS
- 4 x 8" MID FREQUENCY NEODYMIUM CONE TRANSDUCERS
- 2 x 1.5" EXIT, 3" DIAPHRAGM NEODYMIUM COMPRESSION DRIVER TWIN "SERPIS" PLANE-WAVE GENERATORS
- AERO-WARE PREDICTION SOFTWARE

SPECIFICATIONS

Frequency response (±3dB)	45Hz-18kHz
Horizontal coverage angle (-6dB)	90º nominal
Vertical coverage angle (-6dB)	Splay dependent
On axis sensitivity 1W/1m	LF: 99dB MF: 104dB HF: 112dB
Maximum peak SPL	LF: 137dB MF: 139dB HF: 141dB
Recommended processor	DAS digital controller DSP-3VS. Using AERO-48 system without the DSP-3VS controller will result in poor sound quality and can damage transducers

Transducers

Low frequency	2 x 15"-MODEL 15GN, 4" voice coil
Nominal impedance/ power	2x8 ohms/ 2x 600W RMS
Mid frequency	4 x 8"-MODEL 8MN, 2.5" voice coil
Nominal impedance/ power	8 ohms/ 700W RMS
High frequency	2 x M-10N, 3" voice coil
Nominal impedance/ power	16 ohms/ 300W RMS

Neodymium magnets in all the transducers

Recommended amp power 2xAERO-48 in parallel

LF_1 1000/1400W 4Ω LF_2 1100/1400W 4Ω
MF 1000/1400W 4Ω HF 600/800W 8Ω

Enclosure detail

Shape	Trapezoidal 5º
Dimensions (HxWxD)	47.5x140x60cm (18.7x55x23.6in)
Material	Wisa Birch Plywood
Finish	Black polyurethane paint
Rigging hardware	Integrated in cabinet
	MAX. 16 units@10:1 Safety factor
Connector	2x NL8 Speakon wired as LF_1±1 LF_2±2 MF±3 HF±4
Weight	100kg (220lbs)

INTRODUCTION

The AERO-48 is an externally powered, high efficiency line array module which integrates low, mid and high frequency transducers in a single unit. The ruggedly built enclosure is easy to transport by means of the front panel dolly and the captive rigging hardware makes flying safe and simple. The unit is ideal for applications requiring high sound pressure levels and precise control of the vertical coverage.

APPLICATIONS

The AERO-48 system is well suited for large-scale outdoor events or indoor venues such as theaters, arenas or stadiums. The system can be used in conjunction with the AERO-218SUB subwoofer unit for increased sound pressure level in the low frequency range from 28 Hz to 83 Hz.

DESCRIPTION

The AERO-48 three-way system incorporates two15" low frequency units with 4" voice coils, four 8"mid-range devices which utilize 2.5" voice coils and two compression drivers with 3" coils and 1.5" exit geometry. The compression drivers are coupled to two Serpis high frequency plane wave adaptors which insure coherent high frequency summing and the generation of a flat, isophasic wavefront. The components make use of lightweight neodymium magnet assemblies for overall weight reduction and the sophisticated T.A.F. cooling scheme provides higher power handling and low power compression.

The trapezoidal enclosure is manufactured from Wisa® birch plywood and is finished in a durable catalyzed polyurethane paint. A fabric covered steel grill protects the loudspeaker components. The captive rigging hardware and 5º enclosure angles permit splay angles ranging from 0º to 9.6º in 0.8º and 1.6º increments. Ten handles and a front panel dolly with four heavy-duty casters facilitate maneuvering.

D.A.S. SOUND PRODUCTS

AERO-218SUB

aero series

FEATURES

- DIRECT RADIATING SUBWOOFER UNIT
- EXTENDED LOW FREQUENCY RESPONSE
- 2 X 18" LOW FREQUENCY NEODYMIUM CONE TRANSDUCERS
- FOUR HEAVY-DUTY CASTERS

SPECIFICATIONS

Frequency response (±3dB)	28Hz-83Hz
On axis sensitivity 1W/1m	103dB
Maximum peak SPL	140dB
Recommended processor	DAS controller DSP-1Sub
Recommended amp power	1400W @4 ohm

Transducers

Low frequency	2 x 18"-MODELO 18GN, 4" bobina
Nominal impedance	4 ohms wired in parallel
Neodymium magnets	

Enclosure

Shape	Rectangular
Dimensions (HxWxD)	101 x 68 x 82.5cm (40 x 27 x 32.5in)
Material	Wisa Birch Plywood
Finish	Black polyurethane paint
Connector	2x NL8 wired as ±1
Weight	82kg (181lbs)

INTRODUCTION

The AERO-218SUB is a high efficiency, arrayable subwoofer unit designed to provide low frequency reinforcement for the AERO-48. The front-loaded bass-reflex configuration and large enclosure volume offer a compelling bass response.

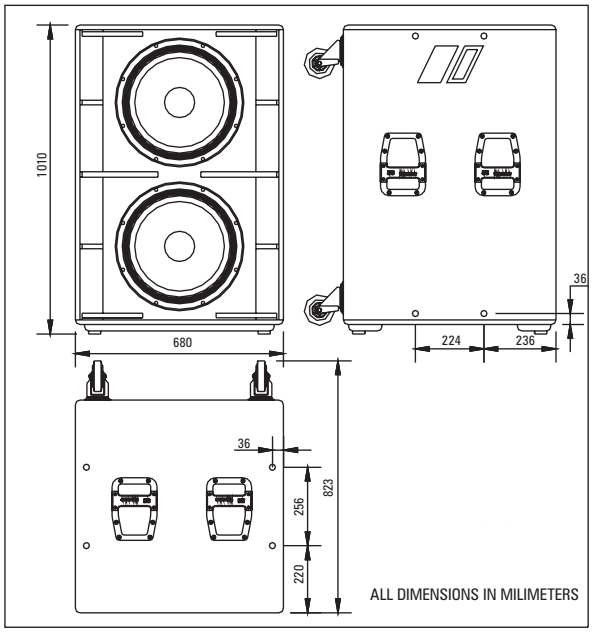
APPLICATIONS

The AERO-218SUB is designed for applications where high sound pressure levels of extended low frequency response are needed. Events such as live concerts or large scale presentations will benefit from the AERO-21SUB.

DESCRIPTION

The AERO-218SUB incorporates two 18" low frequency units with 4" voice coils and lightweight neodymium magnet assemblies. The sophisticated T.A.F. cooling scheme offers effective heat removal for high power handling and low power compression. The rectangular enclosure is manufactured from Wisa® birch plywood and is finished in a durable catalyzed polyurethane paint. A fabric covered steel grille protects the loudspeaker components. The rectangular shape and physical dimensions of the AERO-218SUB allow the unit to be ground stacked with ease. Eight handles and four heavy-duty casters facilitate maneuvering.

The AERO-218Sub unit has a frequency range covering 28 Hz to 83 Hz (±3 dB) with a sound pressure level reaching 140 dB SPL at 1 meter. The DSP-1Sub processor permits sub level and phase adjustments.



D.A.S. SOUND PRODUCTS

US/AERO-01

D.A.S AUDIO, S.A. C/. Islas Baleares, 24 - 46988 Fuente del Jarro - Valencia, SPAIN Tel. 96 134 0525 - Tel. Intl. +34 96 134 0860 Fax. 96 134 0607 - Fax. Intl. +34 96 134 0607
D.A.S AUDIO of AMERICA, Inc. Sunset Palmetto Park- 6816 NW 77th Court - Miami, FL 33166 U.S.A. TOLL FREE : 1-888DAS4USA Tel. 305 436 0521 - Fax. 305 436 0528
http://www.dasaudio.com

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